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An Announcement of Interest.

With this first issue of our fiftieth volume, and this first number in 1910, we present to our readers a paper increased in size and we believe greatly improved in appearance. In common with the demands for standardization which are prevalent in the plumbing and heating trades, as well as in every other line of manufacture, there has come to be known a standard size for trade publications, and in adopting this size DOMESTIC ENGINEERING has placed itself in line with this great improvement in trade publications. Our readers will secure a paper containing much more matter, and we can promise from arrangements already made for the year 1910 that the character of the reading matter will not only be maintained but greatly improved. The leading sanitary and heating authorities of the world will contribute to our columns for your benefit, reflecting the rapid improvements which are taking place in these two useful arts. No important event will be overlooked in recording the news of these active trades. DOMESTIC ENGINEERING will in the future, as it has in the past, advocate the use of high grade goods bearing the name and backed up by the guaranty of the manufacturer. It will continue to advocate the simplification of plumbing and heating in order that the customer may secure the largest possible benefit for the least expenditure. Along these lines only is progress to be recorded. It will continue to advocate by strong associations the moderate control of such features of the trade as can be governed without touching upon the question of price; where abuses in the trade exist they will be attacked, and where efforts are being genuinely made to remove these abuses the support of DOMESTIC ENGINEERING will be assured. The publishers of this paper recognize that large numbers engaged in this business desire to improve themselves and their work, and for them this paper is published in the hope that its strictly up-to-date and high grade technical contributions will form the basis of an educational movement of great value. One of our most interesting departments is devoted to "Questions and Answers," and to this department we solicit contributions; no question should be considered too insignificant to receive adequate attention at the hands of our experts. An exchange of ideas between practical people is the very best way of spreading knowledge. In return for these improvements which we are extending to our readers, we ask an enlarged measure of their loyalty.

To the advertiser the increase of this paper to standard size is a very great advantage. It not only permits a better display of his products, but DOMESTIC ENGINEERING puts itself in harmony with other leading publications, so that copy and cuts prepared for such publications may also be used in this. As in the past we have stood for a definite paid cir-

culation, the quantity and quality of which should be demonstrable to the advertiser who pays for it, so we shall in the future; and we shall continue strictly open and above board methods of newspaper publication, and any advertiser may at any time investigate our claims.

At no time in the history of our country has "progress" been the watch word more universally than it is today, and we desire to meet this demand of the age in every way and we recognize that in meeting it we shall receive the hearty approval of our readers and advertisers. JNO. K. ALLEN.

ROUGHING-IN STACKS AND BRANCHES. V.*

Edited By Jno. K. Allen.

Mem. Am. Soc. Inspectors of Plumbing and Sanitary Engineers; Mem. Royal Sanitary Institute of Great Britain; Assoc. Mem. Am. Soc. Heating and Ventilating Engineers; Hon. Mem. Chicago Architectural Club.

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Connection of Vent Stack to Soil or Waste Stack.

As was previously pointed out, the foot of a vent stack is connected to the accompanying soil or waste pipe. This connection is made as shown in Fig. 3, by means of a y branch and ⅛ bend. The object of this connection is to provide an open passage from the vent stack to the soil or waste stack, so that any rust, scales, dirt, sewage or other matter falling down the vent stack can readily escape to the house drain. If this precaution were not taken, many of the vent pipes might become filled with sewage, owing to a stoppage in a waste pipe, and the vent pipes would thus be rendered inoperative, besides becoming a cesspool for the intention of petrifying sewage. A ¼ bend connection should never be made at this point, for rust scales, instead of escaping to the accompanying soil or waste pipe, would then mass in the bottom of the vent stack and the ¼ bend and completely block the passage. In some installations, where there is a clear water fixture, such as from a drinking fountain, and sometimes when a lavoratory or bath tub is the only available fixture, the waste pipe is connected to the bottom of the vent stack, as indicated by dotted lines, so that the bottom of the stack and bends will be kept perfectly clear by the water flowing through the fixture. The inlet to a soil or waste stack for the foot of a vent stack is always placed in the main line below the outlet for the lowest fixture discharging into it.

The top vent stacks, which are re-connected to the accompanying soil or waste stacks, are usually made with a special vent fitting, as shown in Fig. 4. Instead of this connection, however, where the lines are spaced rather far apart, the outlet to the main stack may be an ordinary T fitting, and the vertical stack of vent pipe connected to the T by means of a long or short turn ¼ bend, or by means of any other combination of fittings. There is no danger of rust scales or other foreign matter obstructing the pipe at this point, so ordinary square bend fittings may be used. Some T fittings are tapped in the side outlet with an ordinary pipe thread so that wrought iron pipe can be connected to the stack. When the vent stack and its branches are made up of wrought iron or steel pipe, it is well to use a topped T fitting at this point. The outlet in the main soil or waste stack for the vent stack to be connected to is located above the vent outlet to the highest fixture discharging into the line. So long, however, as this fitting is left above the outlet to the highest fixture in the top group of fixtures discharging into the stack, it will be high enough, and any further distance from the floor would not add to the layout from a sanitary standpoint.

Offsets to Stacks.

When necessary, in running soil, waste, and vent stacks, to cross with square bends under a floor or ceiling so that there will be a stretch of horizontal pipe, special precautions should be taken with the vent stack so that the horizontal portion will not become completely blocked with dirt. It is obvious that if the vent stack were to parallel the soil or waste stack, that the rust scales falling down the vertical pipe would deposit in the horizontal run, which would then become useless as a vent, when the bore became completely filled. To prevent this, the work is generally installed as shown in Fig. 5. At the foot of the upper stretch of vertical stack, any fitting is inserted and the vent stack connected to the Y fitting as though that were the beginning of the vent line. In this vent stack, however, a T branch is provided, and the section of vent stack from the lower portion of the installation is connected to this vent T. By this means, any rust scales or dirt falling down the upper stretch of vertical vent pipe is discharged into the soil or waste stack, and sufficient scales cannot form in the horizontal portion of the pipe to affect it seriously. The lower section of pipe, it will be observed, is connected to the foot of the soil or waste stack, as in an ordinary case. Such a connection is only necessary when ¼ bend offsets are made and there are several feet of horizontal pipe to run. When an offset is made 45 degs. single bends, the vent stack can run parallel with the soil or waste stack without the safety connection shown in Fig. 5. Forty-five degree bends make the best offset, and should be used wherever possible, in preference to elbow or 90 degrees angle bends.

Outlets to Stacks Above Roof.

All vertical stacks of soil, or waste pipes should be extended up through the roof of the building, where they should terminate in open ends, discharging freely into the atmosphere. This requirement is absolute, and should be insisted upon whether the plumbing is designed on the two-pipe system, or on the one-pipe system. If the stacks of soil and waste pipe do not open to the atmosphere above the roof, there can be no circulation of air through the pipes of the drainage system, consequently the gases of purtrefaction and fermentation will gather in them to an objectionable extent. Furthermore, if the ends of stacks are not open to the atmosphere, air will not be supplied in sufficient quantity to prevent the formation of a partial vacuum in the pipes when a fixture is discharged, and in order to break this vacuum, air will be drawn in through the traps, thus destroying their seals. It is commonly accepted in present-day practice that the stacks should extend through the roof, and little or no difference of opinion exists among plumbers as to the location, height or size of the outlets. The principle is generally accepted that vent outlets above the roof of

*Previous installments in this series of articles were published in the issues of January 23 and 30, February 13 and September 4, 1909. The back numbers can be obtained for 10 cents a copy.

a building should be located well away from any door, window, skylight, ventilator shaft, smoke flue or local vent, communicating with the interior of the building. The air which is discharged from the outlet to stacks is sometimes very bad, and little would be gained by the inmates of a building if the foul air were discharged above the roof only to be carried to the interior of the building by vagrant draughts of air. If the vent openings are located at a sufficient distance from openings to the building, the foul air from the stacks will be so diluted with good air that by the time they reach living rooms the presence of the drain air will not be noticeable. Ordinarily, twelve to fifteen feet is considered a sufficient distance to locate the vent outlet from windows, doors

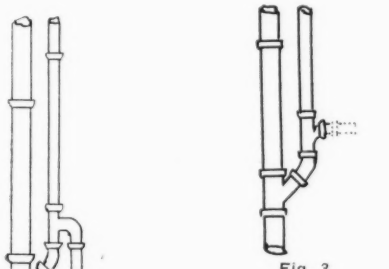


Fig. 3.

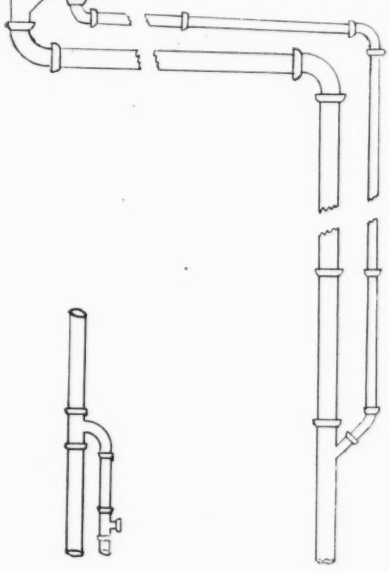


Fig. 4.

Fig. 5.

and other openings, although when greater distance is possible, it is well to place the vents further away, say 20 feet from the inlet.

In some cases a low building is erected between a couple of high ones located one on each side of the new building and close up to the walls. When such is the case, if there are windows in the side walls, of the higher buildings, and the outlet would be within 12 feet of the windows, it might be necessary to extend the outlets above the roof of one of the adjoining buildings. To do so, the vent stack is offset by means of 45 degree bends, to alongside of the higher building, where the pipe is securely fastened to the wall.

When stacks must be extended in that way, the question often arises who is to pay the extra cost. The owner of the low building is satisfied with low vents above his own roof and is not bothered by the nuisance caused by the vent to his neighbors. Naturally, he insists that to protect themselves, the neighbors should extend the stacks, he giving them permission. On the other hand, the neighbor complains of the stench as a nuisance and insists it should be abated. Which view of the subject is correct will depend somewhat on the circumstances. If the walls of the neighboring buildings are free from the party line, so there is a margin between the building and the lot line, it would seem to be the duty of the owner of the low building to extend the pipe, because in that case he no doubt is maintaining a nuisance. If, on the contrary, the windows are in a party wall, or in a wall built right out to the party line, it would seem to be the duty of the neighbor, in the absence of a plumbing law to the contrary, to extend the pipe for his own protection; for in that case, he is drawing air through the window, not from his own, but from his neighbor's property, and he cannot expect his neighbor to be at expense, providing pure air for his benefit.

In the absence of express reasons for extending vent stacks above the roof, as explained in the preceding paragraph, the question arises, what height, under ordinary conditions, should vent stacks be extended above the roof? The answer to that question depends much on local conditions. To begin with, an iron pipe is not an ornamental object sticking through the roof of a building, and the shorter it is made, the less conspicuous it becomes. Furthermore, in cold climates where the outlet to vent stacks become filled with hoar frost during the winter, the more pipe that is exposed, the greater will be the formation of hoar frost with a corresponding diminution of the efficiency of the stack. For these reasons, it is advisable in cold climates to extend vent stacks only about 10 or 12 inches through the roof unless there is some special reason for extending them higher. It is not necessary to extend the pipes above the peak of a roof as would be the case with a smoke flue, for no apparatus in the building is dependent on the operation or draft of the vent stack, which does not require as great and positive a draught or pull as a smoke flue. Wherever the stack emerges from the roof, whether near the eaves or at the ridge, the pipe need be extended only about one foot, providing it is away from all door and window openings. In some cases, if a vent stack were brought out near the eaves of a common A roof, the outlet would be near a dormer window. In such a case, the stack should be carried up inside of the building, following the slope of the rafters, to near the ridge, where it may be extended through the prescribed distance. By this method, the pipe is not exposed either on the inside or outside, and being protected within the building the stack is warm, this promoting draught and at the same time is free from danger of formation of hoar frost.

In the southern part of the United States, or in other warm localities, there is no sanitary objection to extending the vent stack any reasonable height. The only objections in such localities would be artistic ones, to the ugly pipes projecting above the house tops.

On flat buildings, apartment houses, or other types of buildings where the roofs are flat and people, particularly children, have access to them, the pipes should be extended to about 5 feet in height, so the outlets will be above the breathing line, and so children cannot playfully drop things down into the house drain. It is well in such cases to take the additional precaution to protect the outlet to the vent stack by calking in a wire basket. The basket will keep our leaves, paper and other things

which might be carried in by the wind, and will prevent the children, even if they succeed in climping up to the outlet, from filling the pipe with sticks, stones, rags and other rubbish. Vent caps or hoods of any kind should never be calked into the outlet to a vent stack, for they decrease the available air passage without, at the best, doing any good. In cold climates, they actually do harm for, the outlets to the caps being so small, they quickly become stopped by the formation of hoar frost. The use of a return bend calked into the vent outlet above a roof is not objectionable, although it is not by any means a beautiful or ornamental appendage, and may just as well be dispensed with. For the outlet above the roof then, it may be accepted as a rule, that in ordinary cases they are better left open without anything in the way of hoods, cowls or baskets. On the roofs of buildings which are accessible, however, a wire basket should be calked into the outlet. In warm climates the soil and waste stacks should be extended in full size through the roof. In cold climates, on the other hand, where the vent stacks pass through the roof, they should be increased in diameter. The reason for this is that in cold climates hoar frost forms on the inside of pipes, thereby decreasing the bores, and, by making that position of the pipe which extends above the roof, larger in diameter than the rest of the stack, the bore of the pipe can be considerably decreased in size and still leave a passage of sufficient size for the foul gas to pass through. Generally the hoar frost forms of uniform thickness of about one inch deep, all over the inner surface of the pipe. Sometimes, however, the frost forms over the entire outlet.

Pipes which are 3 inches or larger in diameter are not so liable to become completely chocked with hoar frost as a smaller pipe. For this reason, pipes which are 3 inches or larger in diameter are increased only one size where they pass through a roof, while 1½-inch pipes and 2-inch pipes, are increased to 4 inches before passing through the roof. It will thus be seen that no pipe smaller than 4 inches in diameter is suitable for a vent pipe above the roof in cold climates.

Long tapering increasers should be used for increasing the size of vent stacks, and the increasers should be located at least one foot below the level of the roof.

Sights That Are Not Seen.

Out of the Grand Central Station the other day came a couple, the sight of whom caused citizens who saw them admit to themselves that there might be, after all, some basis of truth in the "Uncle Josh" jokes of the alleged funny papers. The old man grasped his carpetbag and bulging green umbrella firmly and looked up and down the street, his mouth agape.

"There's a heap o' sights in New York, I guess, Maria," he said. "I misdoubt if we see them all."

The old lady's mouth set grimly.

"Wall, Silas," she replied, and her manner was more than significant, "bein' as I'm with you, there's some, I expect, that you ain't goin' to see!"—Lippincott's.

Town and Country.

The city fellow delves away,
And all the while
Keeps adding something day by day
Unto his pile.
He talks about the country's charm
And hopes to buy himself a farm.

The farmer tills the stubborn soil,
Subdues the sod,
And banks in autumn for his toil
A goodly wad.
And when enough he's salted down
He hopes to go and live in town.
—Washington Herald.

HEATING AND VENTILATING SYSTEM, FINNEY CHAPEL, OBERLIN COLLEGE, OBERLIN, OHIO.

By B. S. Harrison.*

In laying out the systems of heating and ventilation for this building, the following conditions controlled:

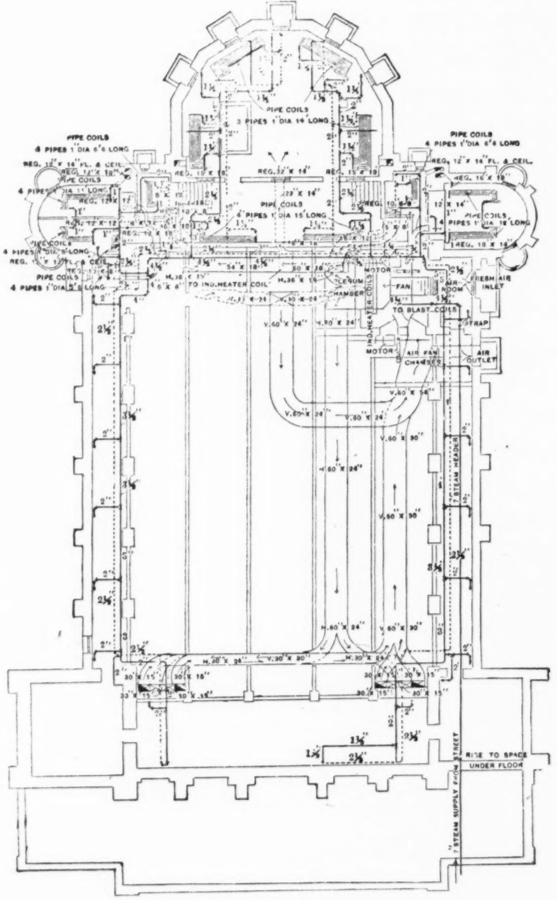
Steam was to be taken from the street mains of the American District Steam Co., at a pressure of between ½ lb. and 5 lbs. gauge.

The building to be in use (in part or in whole) for short intervals with long intervals between, of no heat.

It was desired to be able to heat up quickly in part or in whole.

Ventilation was imperative at times and at other times not desired.

The first cost and the annual operative cost were both important items.



Heating and ventilating system in the Finney Chapel at Oberlin College, Oberlin, Ohio

For the above reasons the systems adopted and laid out as shown by the accompanying sketches were, a single pipe system of low pressure steam direct radiation, supplemented with a fan blast system and a fan exhaust or vent system. The 7-inch steam supply main from the street is pitched to drain back to the street main until a

*Read at the Indianapolis meeting of the American Society of Heating and Ventilating Engineers.

point is reached under the tower of the building where the main rises to the first floor beams and then pitches to the fan room where it is bled to a trap.

In the apparatus room three branches are taken from the main with valves where they leave the main. One feeds the blast coils and two of them supply the direct radiation of the building. The single pipe mains are pitched with the flow of steam and a condensation return line taken from the end of each run. All risers to radiators on the first floor and balconies are taken off single pipe and dripped back into the mains.

The branches for ceiling coils in the choir room and ante rooms under the apse are taken off with two pipe connections, the condensation returns being connected into the returns from the ends of the single pipe mains.

All direct radiators in the first floor and balconies are connected up at both ends with a blind nipple between the 4th and 5th, loops of a 12 loop radiator, thus dividing it into ⅓ and ⅔. Air valves are placed on the 4th and 5th loops.

The fan blast system is arranged so that in warming up the building the air may be recirculated by closing the air outlet doors of the vent fan chamber, closing the fresh air inlet doors of the heating fan chamber and opening the door between the two fan chambers.

The heating fan is arranged in a blow through rig with mitre type of 1 inch blast coils. The condensation from the steam blast coils, from the direct radiation system and the drip from the steam supply main are all passed through low pressure traps into a hot water coil group under the steam blast coils, as shown on the sections. The heated air from the fan system is introduced into the auditorium at about 8 feet 6 inches from the floor and the foul air is taken out at the floor line.

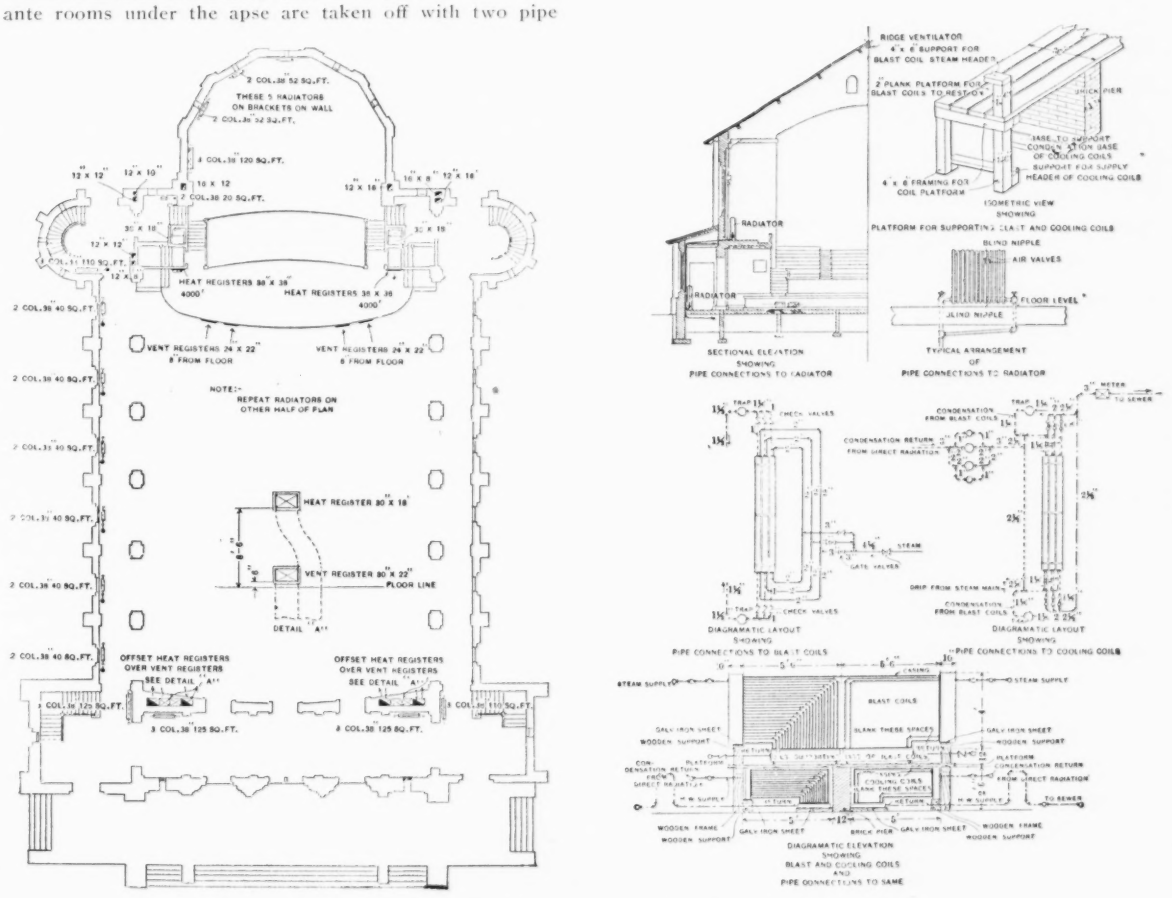
Hand control is used throughout.

The steam blast coils are 12 rows deep, they are double group 4 feet by 5 feet sections, the total steam coil surface being 2,700 lineal feet actual, with a total free area through the double group of 2,400 inches. The fan is 6 feet by 3½ feet, three-quarter housed, driven by an a. c., 220-volt, 60-cycle, 2-phase motor connected to the fan by means of a Morse silent chain. The motor has a speed regulation of about 20 per cent. At full speed the fan delivers 24,000 cubic feet of air per minute. The total free area through the steam and water coils is 22 square feet. The velocity of air through them is 1,100 feet per minute. At this velocity, with steam at 220 degrees F., and the incoming air at 0 degree F., the rise of temperature through the steam coils is about 90 degrees F.

The condensation from the steam coils under these conditions is figured at 2,000 lbs. H20 per hour.

The total amount of direct radiation is 4,095 square feet, and the condensation from same is estimated at 1,024 lbs. H20 per hour at about 200 degrees F.

The water coils are 12 square feet gross area or about 5 square feet free area.


THESE 5 RADIATORS ON BRACKETS ON WALL
HEAT REGISTERS 80" X 38" 4000'
VENT REGISTERS 24" X 22" 8' FROM FLOOR
NOTE:- REPEAT RADIATORS ON OTHER HALF OF PLAN
HEAT REGISTER 80" X 18"
VENT REGISTER 80" X 22"
FLOOR LINE
DETAIL "A"
OFFSET HEAT REGISTERS OVER VENT REGISTERS SEE DETAIL "A"
RIDGE VENTILATOR
2" PLANK PLATFORM FOR BLAST COILS TO REST ON
BRICK PIER
ISOMETRIC VIEW SHOWING PLATFORM FOR SUPPORTING BLAST AND COOLING COILS
RADIATOR
BLIND NIPPLE
AIR VALVES
FLOOR LEVEL
SECTIONAL ELEVATION SHOWING PIPE CONNECTIONS TO RADIATOR
TYPICAL ARRANGEMENT OF PIPE CONNECTIONS TO RADIATOR
CONDENSATION FROM BLAST COILS
CONDENSATION RETURN FROM DIRECT RADIATION
STEAM
GATE VALVES
DRIP FROM STEAM MAIN
DIAGRAMATIC LAYOUT SHOWING PIPE CONNECTIONS TO BLAST COILS
DIAGRAMATIC LAYOUT SHOWING PIPE CONNECTIONS TO COOLING COILS
STEAM SUPPLY
BLAST COILS
BLANK THESE SPACES
GALV. IRON SHEET
WOODEN SUPPORT
COOLING COILS
BRICK PIER
DIAGRAMATIC ELEVATION SHOWING BLAST AND COOLING COILS AND PIPE CONNECTIONS TO SAME

Heating and ventilating system in the Finney Chapel at Oberlin College, Oberlin, Ohio

The total condensation to be passed through the water coils is 3,024 lbs. H20 per hour at 200 degrees F.

The amount of air passed through the water coils at 1,100 feet. V. P. M. is 330,000 cubic feet per hour.

If the water in the coils is cooled from 200 degrees F. to 100 degrees F., the air passing through will be heated from 0 degree F. to 46 degrees F.

On this basis it was figured that the depth of water coil required was 10 rows, but the coils were made 12 rows deep to preclude the escape of hot water to the sewer under any condition of operation.

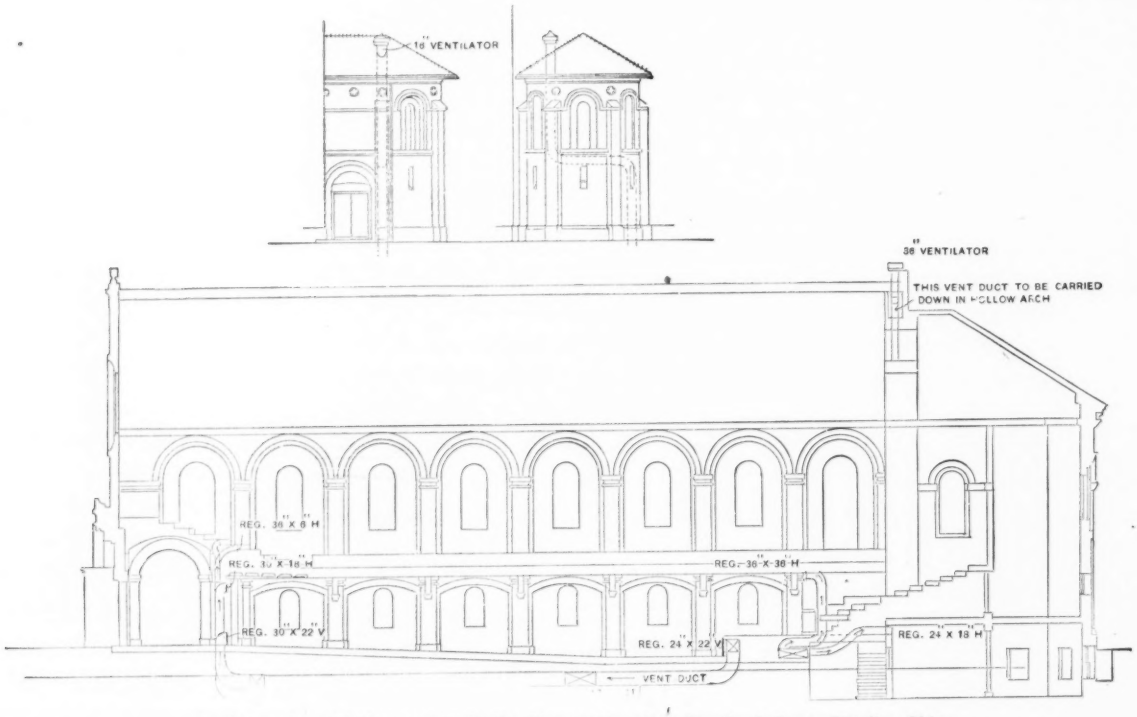
The temperature of the air leaving the heater case is controlled by hand regulation of the steam coils.

The discharge from the water coils is trapped to the height of the return base of the steam coils to insure the water coils being kept full, and is then passed through the American District Steam Co.'s meter and connected with the sewer.

The water coils are bled dry when the system is closed down, by means of hand valves in the bases.

In order to provide a means of gravity ventilation when the fans may be shut down, a ridge ventilator extends the full length of the ridge of the building roof, with butterfly dampers in it controlled by means of cords and pulls from the first floor.

The plant has been in operation over a year and has proven very satisfactory of operation and control, the results being very close to the figures used in laying the work out.


18" VENTILATOR
36" VENTILATOR
THIS VENT DUCT TO BE CARRIED DOWN IN HOLLOW ARCH
REG. 36" X 8" H
REG. 30" X 18" H
REG. 36" X 36" H
REG. 30" X 22" V
REG. 24" X 22" V
REG. 24" X 18" H
VENT DUCT

Heating and ventilating system in the Finney Chapel at Oberlin College, Oberlin, Ohio

Preposterous.

Clancy—"Oi'm after a ticket ter Chicago.

Ticket Agent—"Do you want an excursion ticket? One that will take you there and back?"

Clancy—"Phat's the sinse of me payin' ter go there an' back whin Oi'm here alriddy?"—Hotel Register.

THE RANGE BOILER.

By Charles B. Starkey.

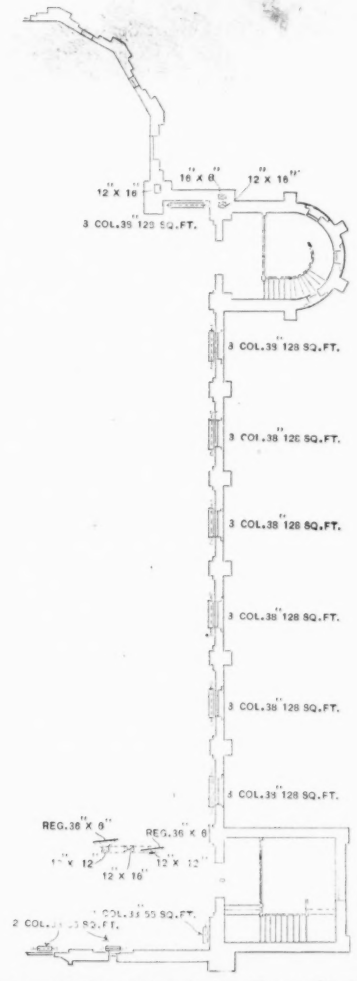
One of the most common articles in daily use, installed in various places, and in almost any old way, is the range boiler, one of the products of modern times.

It has dashed to the earth the fond hopes of many a happy house-holder, and caused rage to dwell in the heart of the plumber upon numerous occasions, and by many is regarded as being more fickle than the blonde goddess of chance.

It generally stands in some part of the kitchen and has a weary, crestfallen air, which may be due to the dirt and dust lodged upon its crown, or the fact that it is obliged to put in many hours overtime in the course of a year. It may also be uneasy because that many times it is regarded as sort of a "wolf in sheeps clothing" from the fact that it bears a brand of "tested at 250 lbs. pressure" when perhaps 125 pounds actual visible pressure would cause it to acquire a hump like unto that of a camel. It is a curious fact, however, that this article so extremely necessary and so often installed is greatly misunderstood. Glance at the columns of any paper pertaining to the plumbing trade and you will find many questions and illustrations in regard to the range boiler. This article has now been upon the market for many years, and yet mistakes are being constantly made with regard to its connections and as to what the water will or will not do under certain conditions. It may be stated in order to heat the water in the boiler there must be a circulation. Now some one will say "everybody knows that," which statement I will not dispute, but I am here to remark that "everybody" does not take heed of that same fact, because if they did there would be about 75 per cent less failures in regard to the proper workings of the aforesaid range boilers. The speed with which the

water will circulate depends upon the heat of the fire and also the distance in height of the circuit the water must travel.

In many cases the flow or hot water pipe is run in an utterly regardless manner and then dropped below the floor, perhaps some feet below the range boiler, and it is expected that a circulation will result which will give hot water quickly at the faucets. It does not come as was expected. Why not? Because the loop is not high enough to give a weight of water which will establish a



Heating and ventilating system in the Finney Chapel at Oberlin College, Oberlin, Ohio

circulation, and any faucets placed along the lower line of the circuit are more than liable to draw cold water.

Many times the pipes between the waterback and the range boiler are too small, and are also not reamed out. A short time passes and the impure water gets in its action and the pipes and water back are stopped up. Result, an explosion either on the part of the water back, or else the owner, at the plumber's bill for repairs.

Now this deposit of lime and magnesia which stopped up the pipes can be prevented by placing an apparatus called an injector upon the cold water or feed pipe. This injector will prevent both the water back and the connecting pipes from becoming stopped up with lime and thus at the first shot remove one of the most common causes of trouble and danger to which the range boiler is subjected. The range boiler could hardly be expected to do perfect duty when a full demand was made upon it and it was given less than half a chance to perform. It would make anybody or anything kick, and the range boiler does this same act much to the annoyance of the entire household, and if the water back is allowed to continue sending steam back to the boiler no permanent relief may be expected.

Another mistake frequently made in fitting up the range boiler is that the cold water feed pipe which extends down on the inside is made too long. This pipe should be of a length which, when put in, would bring the lower end about three or four inches above the level of the water back. The water back can then never be drained.

The range boiler will work all satisfactory if connected with good clean reamed pipe and common sense. It must not be expected to do the impossible. Now, some years ago a plumber made a foxy move and connected the range boiler to the water back and also to a coil in the heater or furnace in the cellar.

This form of connection has caused much anxiety to the average plumber, and yet, under general conditions, it is not difficult.

Connect the water back in the stove to the range boiler in the usual manner, merely leaving a tee at the bottom and a tee on top.

The tee at the bottom is directly under the boiler and into this the lower, or feed, pipe to the coil in the basement is connected.

The other tee, at the top of the range boiler, is connected to the flow pipe of the basement coil, and this should work all right. Instead of thinking about pipes, regard the range boiler as a storehouse into which it is desirable to get a circulation. Before running the system, if any doubt exists in your mind, as to the results, take a pencil and paper and draw out a little sketch. Just imagine how the water would circulate most naturally, and draw it out. Then look at it critically and see if the job balances up well, and if so go ahead and adjust the piping. I am talking about circulation now, not the size of pipes. If this little stunt of thinking were done once in a while there would be a whole lot of better working range boilers in the country than there are at present, and much less kicking from house holders and tenants.

Advantage of Old Age.

James J. Van Alen, at a dinner in Newport, said the secret of longevity lay in open air exercise—in playing thirty-six holes a day on the links, in walking twenty miles, in motoring from sunrise to dark.

Then, apropos of longevity, Mr. Van Alen told a story about a bigamist on one of his farms, says the Washington Star.

This bigamist married a woman, and one of the witnesses afterward admitted to the officiating clergyman that he had known of the bridegroom's legal inability to wed.

"But if you knew," said the clergyman, indignantly, "why didn't you tell me?"

"Well, parson, it was like this," the witness said. "One of the parties was 83 and the other 87. I says to myself, 'Oh, gosh, it can't last long. Let 'em marry, and durn the law.'"

THE DIRECT-INDIRECT AND COILS.

By Phoenix.

It is frequently desired to heat certain rooms in the house and at the same time secure air from the outside for the purpose of ventilation. The cellar may be low, or the owner cranky and not desire his floor ornamented with the register of an indirect radiator. In such a case the ventilating, or what is more commonly known as the direct-indirect style of radiator, may be used.

This form of radiation is made for both steam and hot water and the radiators are so arranged at the base that the air needed in the room for the purposes of ventilation may be taken from outside, through a flue and passed through the base into the inside air heating surface of the radiator from whence it passes into the room.

Most of these direct-indirect radiators are arranged with suitable dampers in the base so that the amount of air entering may be regulated to suit the necessities of the occasion. Hence, if upon a very cold day, the amount of heat secured from the radiator is not sufficient to warm the room, because the cold air from the flue cannot be tempered sufficiently, the damper may be closed entirely and the radiator be made to do duty as a simple direct heating steam or hot water radiator, as the case may be.

While these radiators are not at all complicated in construction nor difficult to install, at times, it is a very trying matter to do a good job because of the manner in which the flue may be constructed, or the carelessness of the mason and carpenter.

These craftsmen generally care little as to how the fitters' work may come out and frequently have not the slightest scruples in pushing the supply stubs aside nor in doing many other things which may make much trouble for the fitter when he is ready to complete the job after having "roughed it in" according to Hoyle. One case I recall was where the fitter was engaged upon an out-of-town job and it was necessary for him to return to the shop, located in another city about 200 miles away. Now the job was nearly completed, so far as the "roughing in" was concerned, but the air conduits to the indirect radiators were not placed. Therefore the fitter left it to the carpenter to do the work and when the job was tested no air came through the flues.

Upon examination it was found that no holes had been cut through the outside walls and that the screens and conduits were merely stuck in place as a "blind" by the dishonest carpenter. Many times the bases do not adjust with the greatest of ease but by using a file or cold chisel and hammer and exercising a little patience the difficulties may be finally overcome.

Generally speaking, however, there should not be much difficulty in placing this style of radiator as the measurements are given in the manufacturers' catalogues and the work can be laid out in a systematic manner, provided the fitter will allow himself to see ahead far enough to do it. The difficulty is that many times the fitter neglects to watch out and therefore finds himself in hot water before he knows where he is at. Of late years the building of steam coils has dropped off to a remarkable degree, the wall radiation taking the place of coils to a large extent.

There are, however, some places where coils may be used with advantage when they are properly constructed.

An old fitter who has been the rounds of the country will know how to go at this job and work to advantage, but many of the younger generation would work to a greater disadvantage at first. They would be ignorant of one of the most vital points of all, at the very start and that is the using of the old fashioned pipe tongs, long since passed from general usage. Now in rapid coil work which may continue for several days or weeks an ordinary pipe wrench is practically useless, while with the muchly despised and old-fashioned "tongs" each pipe of the coil may lay in its place and be easily and quickly sent "home."

The difference in the amount of pipe that can be installed with the "tongs" as compared with the pipe wrench, when applied to this branch of the work only, amounts to about 100 per cent.

On large coils one of the most common forms is called by fitters in some parts of the country the "harp coil," and can be described as resembling somewhat the shape of the letter L with the horizontal part of the letters drawn out to a length varying anywhere from fifty to several hundred feet as the occasion may demand. The vertical part might be five feet in height, or it could extend eight or sixteen or more feet upward.

The construction of the building and location of the coil would have to govern such matters.

One of the first points to be attended to is to be sure that the material is sound. The "knuckles" or pipe couplings should be removed from each length of pipe and placed upon the opposite end, the couplings being reversed. Leave the thread facing out, that has been worked up by being upon the opposite end of the pipe. This gives length of pipe having good tested threads. If the threads upon the pipes are jammed up, run the die over them as this will straighten up the threads and remove the dirt.

This is a place where the helper can be made to earn his money on a big job.

Another point where many fitters fall down is that they do not get the coil pitched or graded correctly. On a long run, and if the windows in the building are near the floor, it is almost impossible to get a "pitch" of one inch in ten feet upon the coil, when it is run under the windows and the fitter may sometimes have to figure down to a pitch of one-quarter of an inch in ten feet.

If the floor is level, giving some basis whereby to start the work, the grading will be very much easier; but frequently there is no floor yet placed and the fitter attempts to run a line by chalking a string and snapping the marks upon the side of the building. This is poor practice on a long run, for the chalk line always sags, and when the coil is placed it will have many traps and be very unsatisfactory because of the hammering and pounding which is sure to take place, much to the annoyance of all.

An experiment I once saw employed in running lines of this kind was to employ a surveyor, who gave us all the true lines at which to locate the supports, and you can wager that the coil had the proper pitch.

Now this might seem an unusual proceeding, but when one lets a fitter fool around for two or three days and get the pitch entirely wrong, which is the cheaper? The coil should be firmly anchored about half way between the extreme ends, which will allow for a better chance regarding the expansion, which must be taken into consideration and should be provided for by placing in the supply and return pipes of the coil the proper expansion joint, or else making the "scissors," or using "swings."

I should recommend making the "harp" first. This is an unhandy contrivance to connect and, for myself, I do not care to use right and left ells. The ordinary right

and left coupling is a poor enough fitting, but I prefer it to the ells which are generally tapped anything from straight.

After securing the harp I would run my coil pipes toward the return end and before arriving (say thirty feet) would start pipes back from the return end, connecting the two lines with right and left couplings. These lines can be made to so approach each other that a few short pieces only will have to be cut to measurements in coupling up, while all the rest of the coil, excepting the "harp," has been constructed of whole lengths of pipe, which can be screwed into place with great rapidity.

ORIENTAL SANITARY ENGINEERING.

By C. T. Evennette, F. I. S. E.*

At the outset of writing this paper, it seems to me that I have misnamed it, for, broadly speaking, engineering in the Orient does not differ from that obtaining in the West when carried out by Europeans. Hence I would prefer this paper to be considered as one on Oriental Sanitation, under which heading I will touch upon a few points in sanitary engineering from a municipal engineer's point of view. In most townships the municipal engineer will find distinctive features attaching to his work which are probably absent from another township. In India there are many castes, and that caste which is in the majority generally governs the lines upon which progress is desirable to be made pacifically. Each caste of people has its distinctive domestic customs and its prejudices, which the engineer soon finds he must consider if he wishes to make progress in sanitation at all.

In my early days in India, I much insulted a man of the "sweeper" caste, employed on conservancy work, by directing him to remove the carcass of a dog which he had let lie on the roadside, sweeping carefully all round it. That was the work of a "dom" caste man, by whom it was eventually removed, to everybody's relief! On another occasion a riot was nearly caused among certain employes at a refuse destructor owing to orders having been issued that all dead rats (which were being caught and killed through our endeavor to combat plague) should be cremated.

Introduce a pipe-water supply into a town, and a large number of the population will refuse to take advantage of it, and will continue to draw their pot water from wells, which are probably absolutely insanitary owing to defective steining allowing subsoil water to percolate, or will take water from deadly shallow wells; close the wells, and you will almost certainly have a riot to contend with. Construct public latrines, and unless they are constantly watched the surrounding ground will be fouled by a class who consider it defilement to enter them. Erect wash-houses for the use of "dhobies" (the caste who wash clothing), and they will at once proceed to raise the amount of the domestic washing bill to cover the small charge made for the use of such wash-houses, and then, if not closely watched, take the clothes to their time-honored washing places to enable them to retain to themselves the extra few pence charged. These old washing places deserve mention. They are usually places in the open near small "pŏt" or shallow wells, made of earthen rings placed one above the other as the well is sunk. A few large slabs of stone are collected near these wells, and upon these the dhobie smashes the linen, whilst the dirty water finds it way gradually back into the well! Under such circumstances, it is not at all surprising that zymotic diseases continue to flourish steadily, in spite of the sanitary efforts of the engineer and the doctor.

I have thought it better to mention a few of the many discouraging difficulties which have to be faced in the East before I proceed to deal with any particular engineering matters, so that, remembering them, you will the more readily understand why the latest and most approved things do not always find their acceptance and use as easily as might otherwise be expected. I will now glance over a few items which a Municipal Engineer has to commonly consider to keep things sanitary.

Roads.

All the best recognized principles in Great Britain are today practiced in the East. It is desirable, however, for the tyro to remember that the amount of "binding" material required in making a road is, to an extent, dependent on the rainfall; more such material being necessary to prevent the road disintegrating in parts of the country having long dry seasons, than in those having more frequent rain. The same consideration, i. e., the rainfall, affects the camber of the road; places subjected to very heavy falls of tropical rain should have roads as flat as possible, otherwise they are cut up into ruts.

Road Watering.

This is of great sanitary importance in hot countries, as besides its protective influence on the road, it prevents the distribution through the wind of decaying refuse. The native overseers, however, unless well supervised, will have the roads watered whilst the sun is still blazing, and by the time people turn out for evening exercise, etc., the roads are dry! I would advise the installation of a water supply such as Calcutta is using for the purpose of watering streets at present. The water is pumped directly from the river Hooghly—a notoriously dirty river—direct into distributing mains, and delivered at high pressure through hydrants and hose on to the roads. The consequence is that, with the water, a very large amount of matter in suspension is distributed, which makes its presence appreciably felt as soon as the roads are dry

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C. E. Reed's plumbing establishment at Bartow, Fla. So successful has Mr. Reed been in that thriving town that he recently opened a branch establishment at Tampa, Fla.

again. A good deal of this matter must find its way to settle on comestibles exposed for sale in the streets. The grit, etc., in the water is also the cause of most of the hydrants being in a state of chronic leakiness—a no small worry to the Municipal Engineer, who is thus held responsible for the sins of others.

Drainage.

I cannot hope to do justice to this wide item in a short paper, and many points will, of course, occur to you which I fail to mention. In the majority of rural districts, and in the most thickly populated, but poorer parts of many large towns, there are no sanitary conveniences worthy of the name in, or at all near, blocks of houses. It is the rule, rather than the exception, in such cases to see people squat down by the roadside to micturate. A little more privacy is generally managed for other affairs. In most houses, however, there is a squatting place in the house, or in the corner of a small attached courtyard, from where sullage water often drains into the public roadside drains—where such exist—outside the houses. Often such roadside drains are earthen, and the result can easily be imagined. A Municipal Engineer, when required to pave such drains in towns having no pipe-water supply, or an insufficient supply of water to allow of a system of sewers being laid down, must take into consideration several points peculiar to such situations. Since all surface drainage water contains a large amount of matter in suspension, it is desirable that the liquid flow as quickly as is compatible with the safety of the material of which the drains are constructed. During the dry season there will be only sullage and a small amount of domestic water to be dealt with, whilst in the rainy season the quantity of water is great. The difficulty is to have such a section of drain as will give a sufficient velocity in the dry season, and still be serviceable during the rains. The saucer-shaped drain is cheap and easy to lay, and, superficially, the easiest to keep clean by manual labor. It is, however, almost the worst shape to put down, as during the hot season the very small amount of water (and that largely sullage) which flows spreads out with very little flow, and also forms a film on the sides of the wide drain from which gases of decomposition quickly emanate.

Any form of drain having angles or a flat bottom are equally objectionable, as the former are very difficult to keep clean, and the latter are not self-cleansing. In fact, this last is worse than the saucer shape. The best form is what is sometimes called the peg-top section. This has an invert of about 135 degrees, with a small radius, and straight sides above it tangential to the ends of the curve. According to the amount of water required to be dealt with suitable dimensions for all seasons can easily be arranged. Covered-in drains, as distinct from a sewerage system, are an abomination in the East, as they are almost impossible to keep clean. A compromise can be arranged, however, when necessary, by having removable covers to the pattern of drain last described (i. e., the peg-top). These covers should be made in short lengths, so that they can be lifted to allow of thorough cleaning of the drain.

The question may here be asked, where does such sullage usually find its way to? I am sorry to say that it very often finds its way to the end of the line of masonry drains, only to flow into earthen drains at the end. The reason is often an insufficiency of public funds to continue the line of masonry drains right outside the township, and there to dispose of it scientifically. When drains empty themselves thus, there is generally a black quagmire for some distance along the earthen line of drainage—and that is all—until possibly some deadly disease breaks out, and then matters are carried further if funds can be made available.

It is possible, however, for the Municipal Engineer, who desires progress, to mitigate these evils with very little cost until further funds are at his command. He can construct a small masonry tank 4 ft. or 5 ft. deep at the end of the line of masonry drains, and at a slightly lower level. This tank should be divided into two compartments by a partition wall—the compartment nearer the end of the drain should be about a third of the size of the other. Holes should be left at the bottom of the partition wall, and an iron grating fitted just below the outfall of the drain into the first compartment. A grillage should be fitted across the larger compartment about a foot from the floor, above which grillage cinders, broken brick, or stone, should be put in, gradually diminishing in size up to the top. By upward filtration of the liquid discharged from the drainage line in this manner a great nuisance and danger to health is thus minimised, as the effluent can then be safely left to meander along the earthen drainage line beyond such a filter. If the amount of sullage from the masonry drains is very small, it would be sufficient perhaps to excavate a length of about 20 ft. or so, to a depth of 2 ft. of the earthen drain, commencing at the end of the line of masonry drains, and to fill this excavation with suitable available metal.

Flushing of Surface Drains Where No Pipe-Water Supply Exists.

Generally, wells are found on the roadsides, and to take fullest advantage of the water so situated the sides of the walls of the drains should be grooved every 150 ft. or so for the purpose of boards being fitted into the grooves across the drain section. One section is then filled with water from the well, and, as soon as the board is withdrawn, if a sweeper starts from the head of the section, and uses his broom properly, the velocity of the water going forward to the next section is much increased, and the drain is efficiently cleansed at the same time.

Sewerage Systems.

Where these are adopted they are usually on European lines, and therefore, I do not propose to discuss them, but will mention a few points that it is desirable an engineer going to India should remember. Owing to the great difference between the amount of water to be dealt with in the dry and the rainy seasons, a "separate" system of drainage is generally preferable. No "combined" system will prove satisfactory where the rainfall in the monsoon exceeds 30 in., for the sewers need to be made such a size that they cannot be self-cleansing in the dry season; besides which there is a greater danger from the formation of sewer gas when such a system is comparatively empty. Supposing a separate system is being contemplated, the capacity of the sewer should be sufficient to also take all rain water which falls upon roofs and which drains into open private grounds; in fact, all water which does not drain direct into the surface-water drains in the public street. The reason for this is the undesirability of having different connections for sewage and surface water within private premises, as it is generally less costly to make an unauthorized secret connection with a surface-water drain; and as the natives are prone to do this, it is better to put it out of their power to do so. Should the sewerage line run along a saturated sub-

soil it will tend to greatly improve the healthiness of the district if provision is made to deal with such subsoil water. In such a case the provision should be included in the capacity of the lines dealing with the surface water. It is undesirable to admit such into the sewer.

The depth of the seal of those on the roadside should not be less than 9 in., as evaporation takes place so rapidly in hot countries. During the dry season it is sometimes a good thing to fill these gullies right up to the top with sand. This allows the small amount of water due to road watering to soak through and prevents foul air from coming out into the street at an inconvenient level. This point suggests the question of ventilation of sewers to the mind. Generally surface-water drains need no ventilating system, as, although the first heavy flow due to the rains may be a little offensive, the deposits are mineral, and as the rains are practically continuous during the monsoon, the first flow is very soon followed by quite inoffensive liquid. Regarding sewer ventilation, all I need mention here is that it is desirable that all vent shafts be made of iron and placed so that the sun shines on them as long as possible. The iron, being a good heat conductor, induces a draught from the sewers. Of course, such shafts should be raised above level of top windows of surrounding houses. A system of placing charcoal trays in surface manholes has at times been tried, but in any humid climate it is quite ineffective, as it is a necessity of such a system that the charcoal remain quite dry.

Catchpits.

These, with by-passes, are advisable with any Eastern sewage system, owing to the natives' habit of cleansing cooking utensils with ashes or sand, whilst some invariably use leaves instead of platters, etc., for eating purposes, which are thrown away after use; some castes use broken tiles, road metal, stones, palm leaves, or any such matter which happens to be handy, instead of toilet paper. All these stuffs find their way, to a large extent, into the sewers, and when mixed with night soil form a hard substance which is difficult to deal with. The provision of catchpits overcomes this difficulty.

Gradients.

For the same reason, the gradients of sewers require to be greater than ordinarily obtain in Great Britain, as the latter are insufficient to remove such general solid matter as finds its way into Eastern sewers. Thus, when detritus finds its way in, 5 ft. per second may be allowed, and where a domestic sewage 6 ft. per second.

House Connections.

Exceeding caution has to be used in providing these. The habits and conditions of life of the natives are very hard to combat. In towns large tenement houses abound, and in each living room there is a washing place (usually about 30 ins. square, with a wall 3 in. high around it) in a corner, which is often used for other purposes. Under such circumstances drainage connections, as understood in Great Britain, are impossible, as they would become hopelessly choked. In such cases night soil is disposed of by hand removal, and the sullage should be dealt with by providing down pipes discharging over traps at the foot, the sullage being carried thence along open drains outside. These open drains should be carried along to drain a convenient number of houses, and at the end one sewer connection is made. By this means any solid substance is arrested, and all fear of escape of sewer gas into houses is avoided. Houses of better class having water-closets must, of course, have separate sewer connections. In this case the depth of seal in any trap should not be less than 6 ins. All branch pipes connecting with the street sewer should be 6 ins., and, although this is theoretically far too large for the amount of sewage, etc., passed along it, it is necessary to prevent possibility of choking of pipes due to so much foreign matter being emptied into these drains wherever provided.

Personally, although the carriage of night soil through the streets is objectionable, I consider that, owing to the average native's apathy, ignorance of sanitary requirements, and the proper use of sanitary apparata, his carelessness, even when he does know it, due to his resignation to kismet, added to the possibility of ill-construction owing to the poverty of those called upon to pay for the connection, want of municipal funds to relieve poor people of this liability, and, even when so relieved, their thanklessness and inattention to rules, etc., after the provision, that there is more danger to public health in providing water-closets in most natives' houses in India than in the want of them. These remarks do not refer to the large or substantial houses of native gentry, but even in their case it is often doubtful wisdom to provide direct sewer connections, as their menials are none too careful.

Jointing of Pipes.

Wherever the banyan tree is seen to be growing near the line of sewers, a good patent jointed pipe should always be provided, as the roots of these trees are most insidious, and in their search after water they will always get through even a cement-jointed pipe.

Public Conveniences.

Since water-closets are not recommended in small native houses, public provision for their convenience outside becomes necessary. A latrine should be supplied within a convenient distance of a block of houses. These latrines vary in design, and are to be found in every town in India. All are designed to enable the native to sit on his heels with his feet on two raised footrests. Some of the poorer people coming into a town and using these latrines for the first time do not know in which direction to face when squatting, and the result means a deposit in the wrong place. To overcome this an outspread hand

The Pioneer Plumbing Establishment of Chas. Geiser & Son, at 309 Santa Fe Avenue, Pueblo, Colorado.

is often painted on the wall which the person should face. This sign, being recognized as a sign of plenty and blessing, a native will not generally turn his back to it. A native also has his share of vanity, and, therefore, if a small looking-glass is cemented to the wall, it also induces him to face towards it. Where there is a water carriage system the latrines are connected directly to that system. Where the water carriage system is only a partial one the solid and fluid matter passes along a sloping shoot to buckets in the rear outside a curtain wall suitably holed. These buckets are emptied into a night soil cart, which carries the matter to the nearest night soil depot, where it is emptied into the sewer. The dry earth system is much the same as elsewhere. In no public convenience should good brass, etc., fittings be used, as the natives will surely steal them. Everything should be bolted, and fittings made of iron.

Night Soil Depots.

Having mentioned these, I had now perhaps best give some explanation of them. They are generally made as follows: An area is strongly paved over in the vicinity of a part of the sewer, and around this area screen walls are built. In the center of the paved area is a central masonry tank, to which a masonry water tank is connected for flushing purposes. This masonry water tank is often built so as to also form the roof of the depot. Over the night soil tank a hopper is fitted, into which night soil carts empty their contents, collected from private houses and unconnected public latrines. The cart is then well flushed with water led from the tank by means of a pipe and hose, and the water so used serves also to help to dilute the soil previously emptied into the hopper. The night soil is discharged from the tank at one end into the sewer by opening a penstock by means of a lever. In passing it may be useful to state that excreta of one person is reckoned as 1.1 lb. per day, and a ton is equal to about 45 cubic feet. This data is found useful in deciding number and sizes of carts required for any given district.

Public Bathing Places.

These have also to be considered in drainage schemes. The municipal engineer is called upon to provide them. They are generally made somewhat as follows:—A certain area is strongly paved within four walls, having a partition wall running along the length, dividing it into compartments for males and females. Two troughs, like large deep horse water troughs, run parallel to and abut against the partition wall. At one end of each trough a ball cock is provided to keep the water at one level. Bathers come with brass vessels which they use to dip out water which they throw over themselves. By inclining the floors inwards or outwards, and connecting with the nearest drain, the place is kept efficiently drained; besides which, the water draining from those places is found very useful for helping to flush the surface roadside drains near by.

Public Wash Houses.

Every town having a drainage system and a pipe water supply should be provided with these, for, as I stated in the early part of my paper, the insanitary way in which clothes are washed by the natives, if left to find a washing place themselves, is a grave source of danger to public health. A typical wash-house is made by paving a sufficient surface of ground with smooth stones on concrete, and jointed and set in cement. In the centre of this platform a long trough is built, and fitted with a ball cock to keep the water in the trough at a constant level. Along both long sides of this trough smaller tanks are constructed at close intervals, which tanks the washerman or woman fills by hand from the large central trough. Opposite each small tank a raised and inclined stone slab is provided, upon which the clothes are beaten. Along one whole side of this washing place, outside the line of slabs, a covered-in shed should be provided, within which clothing can be boiled. With drains provided suitably, this institution in itself is a great advance for a town.

Sewage Disposal.

As this formed the subject of the last paper read to this Institute, I do not propose to offer any remarks, only I would say that, except in some large towns of the first importance in the East, it will be found that the sewage is applied to the land or buried. Most municipalities are too poor to contemplate any change, even if desirable, whilst generally it is not really at all necessary. Providing solids and liquids are kept as separate as possible, no great nuisance arises through smells. When the soil is buried, providing it is deposited in shallow trenches, it is quickly and harmlessly disposed of. If the night soil is passed on to the land, providing the latter is porous so that nitrification can rapidly take place, this method—the most general—will remain the most general for many years to come. It is the natural disposal of a natural product, and following Nature's cycle, it is life to the vegetable world, which in turn sustains the animal.

Municipal Buildings—Slaughter Houses.

In India religious prejudices render it necessary that pigs, sheep, and bullocks be slaughtered separately, since the Hindu looks upon the bull as a sacred animal, whilst the pig is an abomination to the Mohammedan. The buildings are designed upon common principles obtaining elsewhere—all that is necessary to specially point out is that both Hindu and Mohammedan calendars authorize numerous fairs and festivals. These very much augment the average daily requirements, so that the floor space required, reckoned according to the population, should be increased by 50 per cent. The water supply, and other auxiliary supplies, should be allowed for in proportion. Also, taking into consideration the averge menial natives' objection to do work too thoroughly, it is not advisable to slope the floors towards drains. Sloping not only causes the floors to be more difficult to retain a footing on, but the after cleansing is not so efficiently done, as the native will simply sluice them down with water; whereas if the floor be on the level, manual labor with squeegees will be an absolute necessity, thus efficiently cleansing the place.

Latrines—Public and Private.

These should be built so as to ensure:—(1) Protection from the sun and rain. (2) Thorough ventilation. (3) Receipt of solids and urine by separate receptacles, as the admixture causes a more offensive smell. (4) Privacy. (5) A water-tight floor. Only Nos. 3 and 1 call for remark. No. 3 is necessary, owing to all solids being removed by hand to a cesspool or plug chamber or tank admitting into the sewer, where a sewerage system exists, and for carting away for disposal otherwise where no such system exists. Regarding No. 1, it is preferable not to roof in the whole place, as it is thereby made unnecessarily offensive. It is sufficient to roof over the range of seats or squatting places.

Markets.

Religious prejudices in the case of markets also require that separate provision in distinct buildings be made for the sale of vegetables, grains, and fruits, each separate form of animal and feathered flesh, fish, and for dry goods. It is better, from a sanitary point of view, to support the roofs with iron stanchions, and the buildings should be lofty. The floors should be at least 2 feet above ground level, and a drain should be laid down the centre of every gangway. There should be generous latrine accommodation near, and also refuse bins supplied with covers.

Hospitals.

Some form of hospital accommodation is introduced everywhere under British rule. It is curious to know that from about 300 B. C., up to the occupation of India by Great Britain, little or no hospital accommodation existed for the people; although King Asoka, who lived in the third century B. C., ordered the provision of hospitals throughout his kingdom, and his edict is kept in memory to this day by an engraving on the rocks at Girinar in Guzerat. The population of a place in the East is no certain factor to work upon in deciding the necessary provision of beds, etc., as a large number will not resort to a hospital under any consideration. An average, however, is about one bed per 1,000 souls. For an administrative hospital about 1,500 superficial feet of site per bed is a fair average figure with which to calculate the site area required for hospital buildings, including offices, in the East. Regarding choice of site, a site having a low subsoil water level which is permanent is best, and, if no such place can be found, the subsoil water level should invariably be lowered by drainage. No hospital should be built on "made" soil, or, if it is imperative to do so, the site should be covered with a thick layer of concrete. The buildings should face so that winds from a malarial district do not blow in through the windows, but should no such dangerous winds prevail, the windows should face in the direction to enable the most generally prevailing winds to find entry. In malarious climates ward floors should be about 10 feet from the ground, with through air space beneath, and in ordinary damp climates should be raised by means of arched basements to a height of 3 feet or 4 feet to secure air space beneath.

Building Materials.

I will conclude my paper with a glance at a few materials and methods common in India, and which are only worthy of remark because not universally known. A very large number of sun-dried bricks are made in India. These are called "kutcha" bricks, in distinction to burnt or kiln bricks, which are termed "pucka." These two terms are also colloquially used to express ripe and unripe, good and bad, permanent and temporary, etc.; e. g., a "pucka" appointment is a "permanent" one; if a native considers you "kutcha," it is the reverse of complimentary! Please excuse this digression. It is not desirable to use "kutcha" bricks in places infested with white ants, and buildings constructed with such bricks should always be coped with "pucka" brickwork, and the roof eaves should project well, to keep rain off the walls as much as possible. There is a variety of limestone extensively found in India called "kunkur," which is most useful. It is a subsoil tufa formed by the depositing of calcareous matter extracted in particles from sand and clay beds by surface waters and re-deposited in a concentrated form. When the re-deposit takes place in a clay bed a hydraulic limestone is the result. It is necessary to remember that lime made from kunkur—which is a marl line—will not stand any admixture with such material as powdered burnt clay or brick without such materials lessening its natural strength. In making mortar in India, a small quantity of very coarse sugar called "goor" is often used with distinct advantage to the strength of any fat lime. In this matter it should be remembered that no sugar must be used for any mortar made partly with powdered brick, termed in India "soorkee." "Soorkee" mortar is made of one of lime, one of sand and one of powdered burnt clay or brick, except when rapid setting is required, when the proportion of soorkee is increased and sand decreased. A very good artificial cement is made from one of soorkee to one of lime.

Regarding timbers in construction work, teak and sal wood best resist attacks by insects, while the banyan tree wood, although useless for ordinary work, being light and brittle, is very useful under water for use as well curbs, etc. Timber from the cotton tree is also very useful for work under water. Probably any one of the items I have mentioned in this paper could be enlarged on with advantage, but this paper only pretends to be a humble attempt to make a few as "dry as dust" matters of some interest to those who have not yet undertaken work in the East, where conditions are somewhat different to those obtaining in this country.

The British municipal engineer serving in the East is a conscientious and very hard-working individual generally, with responsibilities mostly far in excess of those falling to the lot of engineers in the same relative position in Great Britain. The former's task, on the whole, is rather dreary, and he needs to keep up a spirit of cheery optimism if he would win his way. He receives scant recognition from the native communities he endeavors to serve, and not more from his own country, although his "common sense" and initiative are oftener, of necessity, called into requisition. (One seldom hears of a successful municipal engineer abroad being selected by any municipal body at home, although applications are made more often than is generally known.) The average native contractor's qualifications to undertake a work is, as often as not, solely a financial one. Under these circumstances the municipal engineer's lot with a sanitary work of any importance in hand can easily be ap-

The home of the well-established plumbing and heating business of R. D. Stocking at Billings, Montana. Mr. Stocking is the well-known and popular president of the Montana State Association of Master Plumbers.

preciated. However, in the East, as on the West Coast of Africa, it is well to remember that the policy of (as the negro puts it) "Softly, softly, catch monkey," is the policy by which progress is best made!

Questions and Answers

WHAT CAUSES THE HOT WATER FAUCET TO RUN BOTH HOT AND COLD WATER?

San Francisco, Cal.—To the Editor of "Domestic Engineer." Sir: The hot water faucet upon the lavatory in the house of one of my regular customers has always acted in a peculiar manner for which I would like an explanation from you in the columns of "Questions and Answers." When this particular faucet is opened for a short time lukewarm water will run to the quantity of perhaps half a pint or so, after which a couple of quarts of quite cold water will run. This will be followed by fairly warm water and then real hot water at last is drawn, which is satisfactory.

Now, my customer kicks, and I want to know what can be done to remedy the matter and what is really the cause of the whole business. In answering soon, you will greatly oblige a reader from the

"Golden Gate."

From the manner in which this hot water pipe and faucet works it is a safe bet that the system is not placed upon a circulation. The manner in which this water comes, which appears to be such a curiosity, is merely the result of very natural conditions. The water came after this fashion: First, lukewarm, then cold, then fairly warm, and finally hot. That faucet was on one end of a ½-inch or ¾-inch pipe, while the range boiler was at the other, and it would be a safe guess that this hot water pipe had some dips in it. The first lukewarm water stood in the pipe immediately under the lavatory, while the cold water was lying along the dip somewhere and then flowed forward and into the bowl. This accounts for the lukewarm water and also the portion which was cold. Now the warm water was the first hot water that flowed out of the range boiler; but it was cooled somewhat in passing through the cold portion of the dip in the run. That accounts for the warm water which came after the cold water. Then the hot water which was the last arrival was, of course, drawn from the storehouse or range boiler, and could come, only, when all the rest had cleared the right of way, so to speak, and this is the perfectly natural explanation of the whole trouble.

The manner in which the difficulty may be removed is to place the hot water pipe on a circuit and run short branches from this circuit to the fixtures, when it will be found that hot water will be drawn almost at once at the lavatory.

THE LENGTH OF TIME REQUIRED TO INSTALL A BATH ROOM.

Danville, Ill.—To the Editor of "Domestic Engineering." Sir: I notice the reply of T. J. Wilson, of Phoenixville, Pa., in which he says that to put in the bath room complete, i. e., bath tub, closet, lavatory, range boiler and kitchen sink complete, would require seven days, if lead pipe were used.

From the text of his letter Mr. W. evidently does more iron pipe work than lead. This must be so or he would know better than to assert that a lead pipe job, as installed in Pennsylvania, would take seven days. There are towns in the old Keystone State where the plumber starts work on a bath room on Monday morning (lead work now please remember) and about noon Saturday the job is completed and "tested out." One man, one bath room complete, lead pipe, and five and one-half days. Once in a while a man will complete such an installation in five days, but he is a crackerjack plumber.

I do not see why any one should make the assertion that he could put in a bath room in five days in such positive terms. Now there are places that one sometimes gets into where no man can put in a bath room, alone, in five days, and there are plenty of readers of "Domestic Engineering" who can vouch for this, and if no one answers I will give some instances in a letter at some future date. I trust other readers of your valuable paper will send in some points upon this matter which cuts such a figure in our business.—X. Y. Z.

MANNER OF SOLDERING ALUMINUM.

Louisville, Ky.—To the Editor of "Domestic Engineering." Sir: Can you give me any information on how to solder aluminum? **F. S.**

In answer to our correspondent's inquiry we publish an article which appeared some time ago in the columns of the "Scientific American," which deals with this interesting subject:

"There is no solder which operates with aluminum in the same way that ordinary solders operate with copper, tin, etc. There are two reasons for this.

"First. Aluminum does not alloy readily with solders at temperatures as low as the other metals require, and it is consequently necessary, in soldering aluminum, to use a much higher temperature. Furthermore, aluminum alloys with lead only with great difficulty and with but a small proportion of lead at that; consequently lead solders are useless with aluminum.

"Second. The surface of all aluminum is covered with a thin invisible coating of aluminum oxide. This coating forms instantly on the surface of aluminum and is very refractory, and its presence is responsible for the high resistance of aluminum to corroding agents, since, although aluminum itself is soluble in a great many chemical compounds, this protective coating of oxide is insoluble in almost everything excepting hydrofluoric acid. While in general this coating of oxide is beneficial, in that it forms a perfect protection to the aluminum underneath, it is, by reason of its efficiency in this particular, responsible for the principal portion of the difficulty which occurs in soldering aluminum, as naturally no solder will alloy with aluminum oxide.

"In soldering aluminum, therefore, it is necessary that this oxide must be removed before the soldering can take place; and as it forms again instantly after removal, it is necessary that the removal of the oxide and the covering with solder shall be simultaneous. In soldering other metals, the oxide can be removed chemically. With aluminum this is not possible, and it must be removed mechanically by abrasion.

Bearing these facts in mind, it will be readily understood how aluminum soldering must be done. All the surface to which it is intended that the solder shall adhere must first be tinned. This is accomplished by heating the metal to a temperature above the fusion point of the solder used, and then rubbing the surface with a stick of the solder, thus rubbing the oxide off the surface with the solder itself, and covering the exposed points with

melted solder, all in the same motion. In order to make sure that the tinning is thorough, it is better to rub the surface with a steel or brass scratch brush while the solder on this surface is still molten. This insures a thorough job of tinning. After the edges to be united are thus tinned, they may be sweated together with pure block tin, with the aid of either a soldering iron or blast lamp.

"With regard to the composition of aluminium solders, zinc appears to alloy with aluminium more readily than any other metal available for the constituent part of the solder; consequently all solders which will readily tin aluminium contain zinc in varying proportions. The solders which we have found to be most satisfactory are composed usually of tin, zinc, and a very small proportion of aluminium. These solders do not run very freely nor fuse as readily as ordinary solders, and it is necessary, as stated above, to use a higher temperature—so high in fact that extreme difficulty is found in using these solders with a soldering iron, and it is generally necessary to use a blast lamp.

"Another thing which must be borne in mind is that solder will not flow into an aluminium joint, even when tinned, by capillary action as it does into copper or tin joints, and it is therefore necessary to place on the surfaces to be united all of the material necessary to sweat them together before the edges are brought into contact. In soldering aluminium joints, it is necessary that both the tinning and sweating shall be most thoroughly done; otherwise the joint will not be durable. On account of the presence of zinc in the tinning solder, the solder is decomposed by moisture, and unless the work is so well done that the joint is absolutely waterproof, it will not be durable. The quality of the workmanship has more influence than anything else on the permanence of the work."

HOW TO FIND OUT THE KIND OF MATERIAL WITH WHICH TO LINE A TANK.

Kansas City, Mo.—To the Editor of "Domestic Engineering." Sir: Can you tell me how to decide upon the proper material to line a tank with so that I can be sure I am getting a right start off and will not have to do the job all over in a couple of years or so.—**Kaw.**

Tanks for storage purposes are generally lined with lead or copper. In order to decide which material is best suited to any particular locality it would be a good plan to make a tour of several blocks where such tanks can be found and note the results of such examinations as one may be able to make.

Another means would be to send a sample of the water to a chemist for analysis and he could advise as to the action of the water upon either material.

CAN A WATER-BACK POCKET AIR?

Clyde, N. Y.—To the Editor of "Domestic Engineering." Sir: Will you tell me, if it ever is possible for a water-back to pocket air and if so under what conditions?

Seneca.

If the water-back is so drilled that the outlet for the hot water is not at the highest point, there is a chance for the water-back to pocket air. This might also be the case if the water-back were installed in a careless manner, leaving the appliance not level. If the far end of the water-back, opposite the supply and outlet holes, were an inch or so higher it would be quite possible for it to pocket air and cause trouble.

TO HEAT A GARAGE.

Bay City, Mich.—To the Editor of "Domestic Engineering." Sir: Will you favor me through the columns of your paper of a good method of heating a garage. The building is one story, of brick, about 20 x 30 ft., and it has a door in each end. A cement floor and no basement. please publish as soon as you can.—**Huron.**

From the information contained we should not care to venture a statement on the amount of radiation sufficient to heat this building. We can, however, make some suggestions upon the manner in which it might be accomplished. If there is a steam plant within say fifty or sixty feet and the owner is willing to furnish steam, a line could be run through a tunnel and steam furnished in a sufficient amount to heat whatever radiation installed. We would suggest either coils or wall radiation in this case as it would occupy less space. If an independent plant is desired, there should be no difficulty in installing a small hot water plant, even if the radiators stand upon the same level as the boiler itself. Make use of one of the many pressure appliances which are on the market, which are used for the purpose of placing an extra pressure upon a hot water system, and you should have no difficulty in the matter of obtaining a circulation upon the system.

INFORMATION WANTED ON THE SUBJECT OF SEWER GAS.

Louisville, Ky.—To the Editor of "Domestic Engineering." Sir: Knowing that you can probably give me the information I desire to ask if you can tell me where I can get some accurate information upon the subject of "sewer gas." Trusting to see this in an early number of the paper, I am, Yours truly.—**L. N.**

If our correspondent will obtain a copy of the report of the National Association of Master Plumbers of the United States for 1907-08-09 and read it thoroughly, he will there find this subject treated in a most thorough manner and perhaps be able to gain some new ideas in regard to this subject upon which so much has been written in the past few years. This report is the result of investigations and is well worth reading by each and every plumber in the trade.

MUST THE TANK BE LOCATED IN THE ATTIC?

Omaha, Neb.—To the Editor of "Domestic Engineering." Sir: Will you kindly tell me the best way of locating a tank for supplying water to a plumbing system for a country residence. The owner objects to locating it in the attic and I wish to be informed upon the best way to do this in another manner.—**Missouri.**

We would state that our correspondent can accomplish this by means of the compressed air system.

In installing this work the tank is placed in the cellar. This tank holds several barrels of water which is pumped into the steel tank by means of a powerful force pump operated by hand on the smaller jobs and by a motor upon larger installations.

Now as the water rises in the tank the air must occupy less space and thus acquires a pushing power which forces the water through the water pipes in the house. This system is an ideal one for residences which are located in the country and the amount of force which can be applied will enable one to throw a stream of water over the house in which the job is placed. This is quite an important feature in case of fire as well as for the sprinkling of lawns.

SEWAGE DISPOSAL FOR INSTITUTIONS AND SMALL COMMUNITIES.*

By Theodore Horton, C. E., Albany, N. Y., Chief Engineer, New York State Department of Health.

In presenting a paper upon an engineering subject so highly developed as that of sewage disposal, one's first impulse is to deal with it from a more technical point of view, or to present only such knowledge as is based upon the latest discoveries or experiments. The speaker's experience, however, has convinced him that it is not so much knowledge of this nature that is desired among our state sanitary fraternity as it is a knowledge of fundamental principles, and of the application of these principles in daily practice. If I am not correct in this view, I hope that I may be pardoned for presenting, in so elementary a manner, what I have to offer upon this subject today.

I wish, first, to explain briefly about the origin and composition of sewage, and the standards by which proper methods of sewage disposal are compared or judged; then to describe the various methods which are at present successfully practiced in the purification of sewage; and finally to discuss these different methods with respect to the quality of their effluents, and to their applicability to small communities and institutions.

Sewage has been variously defined by sanitarians as water which is dirty or defiled, or to which they apply some adjective suggestive of physical characteristics or appearance. Since, however, the origin of sewage, more particularly domestic sewage, is the public or private water supply, it has become customary for engineers to consider domestic sewage as the spent water supply. There are, of course, other kinds of sewage, as, for instance, industrial, combined and mixed sewages, which are derived either from specific industries, or from variable mixtures of domestic sewage, industrial sewage and surface water. These latter classes of sewage, however, will generally require special methods of treatment, and since they will rarely be met with in smaller communities or institutions, will not be considered in this paper.

Considering, then, purely domestic sewage, we find that it is derived from the portion of the public or private water supply used for strictly domestic purposes. This will include the water used for drinking, cooking and culinary purposes; for the laundry, the stables and the lawn; and for the removal of human excreta. If we assume that the original water supply be practically pure and wholesome—one, for instance, derived from an uninhabited watershed, having a gently sloping topography, a sandy or igneous rocky surface, free from swamp lands, and compare with it the sewage derived from its domestic consumption, we find a marked and interesting contrast.

The water derived from such a watershed will be comparatively low in mineral and organic matter. There will be no clay deposits of a sedimentary nature, nor soft rocks of a solvent nature, to give rise to any appreciable amounts of suspended or dissolved mineral matter. Nor will there be any swamp lands, or ponds, in which microscopical organisms can develop, or give rise to any considerable amounts of suspended or dissolved organic matter. What bacteria are washed from the uninhabited slopes, and are retained in suspension in the stream, will be of a harmless variety commonly known as a water bacteria. Finally, and what is of most importance, this water will be practically saturated with oxygen; that is, during its passage through the air as rain, and its flow over, or through, soil that is thoroughly aerated, it will have absorbed as much of the atmospheric oxygen as it is capable, and, in the absence of any considerable amount of organic matter, or microscopic organisms, it will retain its condition of saturation.

Contrast the same water after it has been used in the household for the various purposes outlined above and has been discharged into our system of sanitary sewers. It will now be highly charged with organic and mineral matter, derived from the wastes and washings of the household. The bacteria, which in the original water number only a few per cubic centimeter, will have increased to somewhat more than a million. The dissolved oxygen will have been reduced from a condition of saturation to practically zero, having been consumed in the process of decomposition carried on through the agency of the bacteria.

If the sewage be fresh, or if it be relatively low in organic matter, or for other reasons the supply of oxygen be not exhausted, there will be little, if any, odor to it. If, on the contrary, the sewage be stale, or highly charged with organic matter, or subject to a condition of active decomposition, in the absence of oxygen, the sewage will become offensive. In other words, so long as there is oxygen present in the sewage, decomposition takes place slowly, under aërobic conditions, without the production of gases; while as soon as the supply of oxygen becomes exhausted, decomposition continues, under anaërobic conditions, with the evolution of gases, some of which, like sulphurated hydrogen, are offensive. This decomposition under anaërobic conditions we usually term putrefaction.

Considering the composition of domestic sewage more in detail, we find, in our American communities, that it contains from 400 to 500 parts per million of total solids. Of these solids, about two-thirds are found to be in suspension and about one-third in solution. Again, of the suspended solids, about two-thirds are organic matter and one-third mineral matter; while, of the dissolved solids, about one-third is organic matter and two-thirds mineral matter. It is, in fact, this small amount of organic matter, less than five one-hundredths of 1 per cent, which gives to this class of sewage its objectionable qualities, and renders it at times difficult of purification.

When sewage of this character is discharged upon land, or into a body of water, it becomes objectionable, usually in one of three ways. It may, in the first place, become objectionable in appearance, due to the floating or fine suspended matters present in the sewage. These matters tend to form unsightly deposits upon the bed and banks of a stream, and to interfere in many ways with the industrial or pleasure purposes for which a stream may be used. This objectionable feature, while affecting mainly the aesthetic quality of a stream, and only those persons or industries that actually use the water, does not in itself affect public health.

In the second place, sewage may become offensive as a result of a diffusion of gases, resulting when decomposition is carried to the point of putrefaction. Although this feature affects the comfort of those living along or in the vicinity of a stream, the most careful investigations fail to reveal that it has any serious effect in producing specific diseases.

Finally, sewage may become objectionable through the dangerous ingredients contained in it, which affect the health of human beings. These are the pathogenic or

* Paper read before a recent conference of Sanitary Officers of New York State.

disease-producing bacteria frequently present in the sewage. They enter it from a variety of sources—such, for instance, as from human discharges, or from laundry water in which the clothing of sick persons has been washed, or from sewage derived from hospitals. Where sewage of this character is discharged into bodies of water, used subsequently for drinking purposes, it is evident that the transmission of disease is invited.

Any method of sewage disposal, then, must have for its object the fulfillment of one or all of the following requirements, viz.: to remove the coarse and fine suspended matter; to prevent offensiveness to the body of water or land into or upon which the sewage is discharged; and to render harmless the disease germs contained in the sewage. The extent to which these requiremnts must be fulfilled, in any case, will depend upon the volume, the character and the uses made of the stream into which the sewage is to be discharged. Although there are no set rules that can be strictly adhered to, we may make the following generalizations with respect to such requirements:

First, where a stream is not subsequently used for a public water supply, but where its aesthetic or industrial qualities are important, and where the volume of flow is so large, as compared with the volume of sewage, that offensiveness will not result, it will be only necessary to remove the suspended or floating matters by efficient screening or settlement.

Secondly, where a stream is not used subsequently for a public water supply, but where the volume of sewage discharged into it, compared with the volume of flow, is so small that offensive odors may arise, it will be necessary, in addition to the removal of suspended matters, to remove or oxidize the organic manner in the sewage. This can only be done by means of sewage purification, and the effluents under these conditions must be what is termed stable, i. e., purified to such a degree that it will not of itself, or when discharged into the stream, subsequently putrefy.

Finally, where a stream is to be subsequently used for a water supply not adequately protected by water purification, it may be necessary to remove all substances from the sewage, including the bacteria. It is only fair to state, however, that this standard of bacterial removal has never been attained in practice by any method of sewage disposal yet devised; nor, in fact, was such a standard originally contemplated in the early days of the art of sewage disposal, when the only object was the removal of organic matter and the prevention of a nuisance. The present demands for higher standards are of comparatively recent origin, brought about through a keener appreciation of the dangers of stream pollution and a more advanced knowledge of the art of sewage purification.

Let us now consider some of the methods which are practiced today for the disposal of sewage, and compare in a general way their relative merits in fulfilling the requirements outlined above. Perhaps the oldest and most generally utilized method of disposal is that of discharging the raw sewage directly into a stream or other body of water—more technically known as the "method of dilution." Since this method, as outlined above, is applicable only in cases where the stream is not subsequently used as a water supply, it becomes evident at once that its utility in localities like that of New York State must be very limited. This method having, however, a limited applicability under proper restrictions, it becomes necessary to know what degree of dilution will prevent offensiveness.

Experience gained from a study of numerous cases in Europe and America indicate that, whereas no specific rule can be set down, applicable to all cases, there are certain general standards which may be safely followed. The unit usually adopted is the amount of flowing water which is required to properly dilute the sewage of 1,000 persons after it has been thoroughly dispersed through the water-section. When this volume is less than three cubic feet per second, the dilution is not sufficient to prevent offensiveness, even under favorable conditions. When it is greater than seven cubic feet per second, there is rarely produced any offensiveness, even under unfavorable condiitons. Between these limits, then, of three and seven cubic feet per second must lie our standard of dilution for any particular case—depending upon the character of the water, the strength of the sewage, the addition of manufacturing wastes and the existence of mill ponds, or stagnant pools, where deposits may occur.

If, then, a community is favorably situated, with reference to a large body of flowing water, the method of dilution becomes a satisfactory one. If, however, it is not so favorably situated, or if the sewage must enter a stream or river which is subsequently used as a source of water supply, or if it is discharged into tidal waters in proximity to oyster beds, this method must be abandoned in favor of some method of artificial purification.

Of these artificial methods perhaps none is more effective than that of filtration, or the slow percolation of the sewage through beds of porous soil or sand. This method has been used for more than a century. It is, in fact, nature's method of purifying dirty water, which, after rains, flows over the surface of the ground, descends slowly through the pores of the earth, and finally issues as pure spring water.

This method of filtration has been very thoroughly studied for many years, in this country and abroad, and it is now possible to foretell, within narrow limits, how much sewage of a certain composition can be successfully purified when the quality and the size of the sand grains are known. Generally speaking, an acre of good effective

"Not Exceeding the Speed Limit." This famous joy ride took place in Uniontown, Pa., one day last week. The skilful chauffeur is Charles L. Titus, president of the Pennsylvania Master Plumbers' Association. The precious cargo which is being rushed over the ground at this moderate speed is A. M. Rhodes, the most able business assistant to Mr. Titus.

sand can be so arranged as to purify indefinitely the sewage of about 1,000 persons. If the sand is coarse and deep, or the sewage has received some preliminary treatment to remove the suspended matters, a still larger amount of sewage can be treated. If the sand is fine, or mixed with loam or clay, this amount must be correspondingly decreased, reaching almost nothing for soils composed mostly or wholly of clay.

It is usual to arrange sewage filters in beds, or units, of a definite size, with the surface nearly level, to insure a uniform distribution of the sewage. Beneath the surface, at a depth of a few feet, is laid a system of collecting pipes or underdrains. The sewage is applied in turn to each of the beds, and, after percolating slowly through them, is collected in the system of underdrains and discharged into the nearest water-course.

When beds of porous material are not available, or land is expensive, it is frequently found more economical to purify sewage by some other method than sand filtration. Of these methods, chemical precipitation has been satisfactorily practiced in the past, and although this method has given way to more economical and effective methods, it is still practiced in many places.

By this method the sewage is passed through tanks, after it has been treated with certain chemicals, such as lime, or salts of alumina and iron. The sewage may be passed slowly through the tanks at a uniform low velocity, or tanks may be filled, allowed to stand for a period of time and then discharged. In either case, the chemicals unite with certain constituents in the sewage and from a coagulum, which settles to the bottom of the tanks, carrying with it and precipitating upon the bottom the suspended matters of the sewage. The relatively clear effluent is then passed off and discharged into the nearest water-course or subjected to further treatment.

This method of disposal at the present time is not considered a complete one in itself, but is practiced as such in some places, and is frequently employed as a preliminary treatment. The difficulty of disposing of the sludge, the high cost of chemicals and the low purification effected make this method, however, a comparatively expensive one, and the field of usefulness restricted to peculiar local conditions or to the disposal of certain classes of trade wastes.

Of greater utility than the chemical precipitation tank is the so-called septic tank. The origin of this appurtenance in sewage disposal is our well-known cesspool. In fact, the septic tank may be considered nothing more than a large cesspool, scientifically constructed and operated, so that the highest biological efficiency is attained. If, then, through a long and narrow tank domestic sewage is allowed to pass, certain results are obtained, depending upon the rate at which the sewage flows. When this rate is relatively high, i. e., the period of detention in the tanks is less than, say, four hours, we get a mere settling or sedimentation of the sewage, i. e., a merely mechanical result, with no appreciable biological action. When this rate of flow is lessened, however, and the detention period increased to, say, eight hours, we secure entirely different results. Instead of mere mechanical subsidence, we have, in addition, a bacterial or septic action which produces marked changes in the organic matter.

The biological process carried on in the septic tank are rather complicated. They are also quite variable in activity, depending upon many factors, such as the composition and age of the sewage, its temperature, the period of detention and the velocity of flow through the tank. The process may be briefly described as one in which decomposition is allowed to continue until the sewage putrifies. The bacteria, working under anaërobic conditions, are able to break down the more complex and unstable organic compounds, and convert them into simpler and more stable ones. This conversion results in a liquefaction of portions of the suspended organic matters, and a liberation of certain gases, such as sulphuretted hydrogen, marsh gas and ammonia. The portion of the suspended organic matters not liquefied either rises to the surface to form a scum over the liquid in the tank, or settles, together with the mineral suspended matter, not previously removed by settling or screening, to the bottom of the tank, in the form of sludge. This sludge must be removed, from time to time, and disposed of by special treatment.

The septic tank thus fulfills a two-fold object: the removal by subsidence of a considerable portion of the suspended organic and mineral matters, and the decomposition and liquefaction of a large part of the suspended organic matter. The organic matter thus converted is in a condition which many believe to be better suited to subsequent oxidation and nitrification than is the case with the raw sewage. And whatever may be said against the economic value of the septic tank, there is little question but that properly septicized sewage is more easily treated than either raw sewage, or sewage that has been subjected to plain or chemical precipitation, and that the septic tank will continue to be a useful preliminary device in sewage disposal for many years to come.

The treatment of either settled or septic sewage is usually accomplished by means of sand filtration, previously described, or by means of coarse grained or rapid filters. Of the latter class of filters there are two general types; the contact bed and the sprinkling filter. Although both are composed of the same materials—a mixture of coarse stone, gravel or coke—and are usually laid out in beds or units, their construction and operation are somewhat different.

The contact bed is usually constructed as a tank, in which the filtering material of graded sizes is deposited, with the coarser material at the bottom. The sewage is run onto the bed until it is full, and is allowed to stand in contact with the filtering material for a definite period of time. During this interval, and under the conditions of ample supply of oxygen, the organic matter is rapidly acted upon by the aërobic bacteria, until it is oxidized or nitrified, i. e., subjected to the last chemical change, or action, in the process of decomposition. At the expiration of this time period, ranging usually from two to four hours, the purified liquid is drained from the bed and discharged into the nearest stream, or subjected to further treatment.

With the sprinkling filter, the construction is almost identical with that of the contact bed, except that the walls surrounding the filter may be omitted. The sewage is, however, applied in a very different way. Instead of flooding the filtering material, the sewage is distributed, through nozzles, over the beds, in the form of spray, and allowed to percolate through them to the underdrains beneath. In this way a better opportunity is afforded for aëration and nitrification, and results show that, not only is the bacterial efficiency of the sprinkling filter higher than that of the contact bed, but that, owing to the better opportunities for oxidation, a larger volume of sewage can be purified per unit volume of fitlering material.

The effluents from both contact and sprinkling filters, though stable in themselves, and generally of satisfactory quality to be discharged into any water-course, are, however, not entirely free from suspended matters. Fine, and sometimes rather coarse, particles of the film, or coating, attached to the stones of the filters, which form harboring places for the bacteria while performing their work of nitrification, become dislodged and are carried into the effluent. These particles are mostly stable, inert matter, relatively coarse and heavy, and subside quickly when the velocity of the effluent is checked. When it is desirable, then, to remove this suspended matter, and secure a clear effluent, it is only necessary to pass the effluent through a settling tank of moderate size and allow the suspended matter to settle out.

Again, we find that the effluents from these rapid filters are not entirely free from bacteria, and in some cases they show a very incomplete removal. These bacteria are, in a large measure, carried into the effluent along with the other suspended matters just described, and are probably of the harmless variety of nitrifying bacteria that have developed either in the septic tank or in the filter. It is also probable that many of them are of the pathogenic species originally present in the sewage, so that there may be cases where it is desirable or imperative to remove not only the suspended matter, but also the bacteria. When this standard of purity is demanded it becomes necessary to resort to supplementary treatment either along lines practiced for the purification of water, such as mechanical or slow sand filtration, or by some method of sterilization.

In passing it may be noted that this stage in the process of sewage purification represents the connecting link between problems of sewage disposal and water purification. The effluents from rapid sewage filters may be very properly compared with the turbid waters of many of our streams, which have received some pollution, and their purification can be accomplished not only in the same degree, but in the same manner as such waters. It will, of course, be rarely, if ever, demanded in practice, that a potable water shall be produced from a sewage effluent, but what may frequently be demanded, especially in the future, is an effluent that is not only sufficiently purified of its suspended or other organic matters to pass the test of stability, but one in which all of the bacteria shall have been removed or destroyed.

Although mechanical or slow sand filtration can, as suggested above, accomplish these results, recent studies and investigations indicate that it may be accomplished by the simpler and less expensive method of sterilization. In fact, the final purification of effluents represents the most fruitful field of sewage experimentation at the present time. These experiments seem to indicate that sterilization may be accomplished most satisfactorily and economically by treatment with certain chemicals, such as lime and copper sulphate, or by ozone and chlorine, generated electrically from the atmosphere, or from certain salts. The study of the final treatment of effluents, as with that of preliminary treatment of sewage, resolves itself then mainly into one of relative cost and, at the present time, the sterilization of effluents by chlorine or ozone seems to give the greatest promise.

It is clear then, from what has been said, that there are a number of methods of sewage disposal, including preliminary and final treatment, by which it is possible to secure an effluent having almost any desired purity. The question as to what standard shall be demanded in any case can only be arrived at after the most careful study of local conditions with respect to stream flow, and of the dangers of infection resulting from a subsequent use of the water. The question as to which of the methods of disposal will be most appropriate in any case will depend not only upon the standard required, but upon local conditions, such as those affecting the cost of construction and the relative merits of the various types of plants, in producing an effluent of the required purity.

In conclusion, then, one may say in answer to a hypothetical question, as to what would constitute a modern and complete sewage disposal plant, adequately suited to the requirements of a small community or institution, where a high standard of purification is demanded, that it should, under ordinary conditions, and according to modern engineering practice, comprise the following general features or devices:

First—A combined screening and settling chamber of moderate capacity, provided with screens, for the removal of the coarse or grosser solids from the sewage.

Second—A settling basin or septic tank for the precipitation or transformation of a considerable portion of the organic and mineral suspended matters.

Third—A biological filter of the slow sand or rapid coarse grained type for the oxidation and nitrification of the organic matters remaining in the settled or septic sewage.

Fourth—A small settling basin, into which the effluent from the biological filters is received and sterilized, for the precipitation and destruction of the remaining suspended matters and bacteria.

With an installation of this description, properly designed and constructed, and intelligently operated, we should obtain a sterile effluent of sparkling appearance, and practically free from organic or mineral suspended matters—an effluent suitable to be discharged into any stream, without fear of destroying its aesthetic qualities or of producing a nuisance, or of transmitting disease.

TEMPERATURE OF COAL PILES.

The old method of determining the temperature of a coal pile by driving pipes and hanging thermometers in them has been greatly improved by means of a special coal auger designed and used by the Coal Department of the Arthur D. Little Laboratory, Boston. It is similar in form to that used in the mines, but is provided with a means of inserting a small maximum thermometer near the point. Extensions, four feet in length (for convenience in carrying) may be attached to the augur so that the thermometer can be readily inserted into any depth in a pile. The point of the auger can be driven 20 feet in three to five minutes. About 10 minutes is required for the thermometer to attain the temperature of the surrounding coal. Temperatures taken in this manner are much more accurate than those obtained by hanging a thermometer down a pipe where there is more or less circulation of air, making it impossible to locate the hottest spot. Temperatures obtained by means of the auger have been found to be 40 degrees Fahrenheit higher than by the pipe method.

Hearing Things.

She (sternly)—I heard a noise very late.

He (facetiously)—Was it the night falling?

She—No, it wasn't. It was the day breaking.—Baltimore American.

STEAM HEATING AND SOME OF ITS WASTES.*

By Thomas P. Abbott, of Worcester, Mass.

It is surprising how little some of the firemen operating steam heating plants know about the philosophy of heat, the circulation of steam and the adjusting of drafts, checks and dampers while they know absolutely nothing about adjusting them to the diaphragm by chains and pulleys so as to balance them equally and depend on water to maintain a given pressure of steam, consequently as even a heat as weather will permit.

It is not so much the coal burned that makes the heat as it is the oxygen consumed, consequently we do not burn so much coal, hour for hour, when we have good zero weather, as we do at freezing or warmer weather if the air is heavy. More coal is consumed with less heat produced when the air is heavy than when the thermometer registers zero. Usually the colder the temperature the more oxygen in the air, consequently the more intense heat with the same expenditure of coal.

The fire under a boiler is as good a barometer of the weather as one need have if one is at all observing. The approach of a storm is clearly indicated from 12 to 48 hours ahead of time; the minute the air begins to get heavy it is noticeable in the burning of the fire. When the air is heavy better results can be obtained from hard coal; the fire being more open, more air can pour through it, consequently with soft coal a thinner fire attended to oftener will produce the best results. Indifference to atmospheric conditions means a constant waste of fuel that can be overcome by the firemen.

Another waste of fuel comes from the practice of keeping the fire on the hearth of the firebox; no air can pass through it, consequently no heat is produced by it, the coal there being burned by the heat of the fire on the grate. It is a back fire, the result being that the crown shield and door are warped all out of shape. But with the fire always at the edge of the grate, no matter how intense the heat in the firebox, it will not injure the door or crown plate.

The ashes should never be allowed to accumulate under the grate to get nearer than six or eight inches from the grate; to let them pile up under the grate shuts off the draft and burns out the grate.

Since it is the heating surface that determines the horse power of the boiler the tubes and flues should be cleaned frequently, determined by the kind and quality of the coal used. With anthracite they should be cleansed once a week, bituminous makes more soot, therefore fouls the heating surface and the chimney more. Soot in the chimney absorbs moisture and impairs the draft. Six pounds or so of old zinc cut into pieces three or four inches square and thrown onto a good live hot fire about once a month will clear all the crevices and chimney of soot.

Since the circulation of steam is very essential to the equal distribution of heat the return pipes should be in perfect working order. If the water by the glass gauge keeps dropping during the day, and during the night, when the fire is banked, comes back into the boiler, it is a pretty sure sign that there is an accumulation of rust in the return pipes. In that event shut off the valve between the boiler and blowoff pipe, then blow off the returns into the sewer.

Thus far I have dealt only with the fireman and the waste he is responsible for. Now let us see where the landlord or owner comes in.

Since it is the oxygen we consume that makes the heat, all boilers in cellars where there is no window or door nearly on a level with the firebox of the boiler, should have a draft box from 50 to 300 square inches capacity, according to the capacity of the boiler, so that the air for the fire may be taken directly from outdoors. Otherwise the air is rushing through the crevices of the doors and windows; if it cannot get in that way, you are trying to get heat out of vitiated air, which cannot be done. If outdoor air can get in it makes the cellar cold, and tenants on the first floor must have more heat to overcome the effect, thus wasting fuel. But with the draft box the cold air is going directly to the fire where it is needed, and the temperature is always warm and even.

The cheapest coal is the dearest coal to buy, as it contains more refuse and makes more ashes and hard, irony clinkers, and in bituminous coal more soot to foul the flues and chimney. The coarser the coal the more air passes through it, consequently the more heat is obtained. The method of mixing chestnut with egg or broken is a false economy. If your fire burns too freely, check it with your drafts, then when the air is heavy give it more draft. This is, where hard coal has the advantage over soft, but taking right through the season the soft coal is the most economical, as no more tons of soft will be burned than of hard.

Since the good circulation of steam is essential to the equal distribution of heat, the landlord or agent should see to it that the air-valves are in good working order. The best valve is the float valve, and the cheapest valve on the market is the best. It is best because the most simple, and absolutely cannot be tampered with by the users. But the float valve should never be put on to a new cast-iron radiator for the first season, as the particles of molding-sand will keep working out and clog the valve, so that the float will not work. The best valve to use for the first season is the open valve, that can be opened or closed at will. The trouble with the open is that the user will leave it open, so that when the steam comes on water will run out and stain the ceiling underneath. On the pipe radiators, the float valve may be used at all times.

The neglect to have good air-valves will waste more coal in a season than it would cost to put on new ones, for if the cold air cannot get out of the radiator, the steam cannot get in, and the fireman will try to overcome the difficulty by burning more fuel.

It is surprising how indifferent the owners are to this waste. It is not two weeks since I was obliged almost to abuse one of my present employers for his neglect that I had pointed out to him more than two months before; then he remedied the trouble to his and my peace of mind. There is no economy in neglecting to terminate remediable wastes when pointed out.

The greatest waste is directly attributable to the tenant or user, and since the woman is in control of the house, it is directly attributable to her. It is not willful and malicious waste, but because she does not know the philosophy—and right here let me say what I should have said under the criticism of the owner. He should have instructions printed and posted near each radiator for the benefit of his tenants. A set might be arranged by some competent person that would apply to all steam-heated houses, and printed in quantities to be supplied at from one to two cents each.

*Paper read before the Socialist Club of Worcester, Mass.

Steam, in common with all things, seeks the point of least resistance, and steam's point of least resistance is where the greatest condensation is taking place. Right here is where the greatest waste is traceable. Where windows are open with the steam on, all the steam rushes to this point, and the tenant is not getting any heat in the rooms where it is needed and windows are not opened. Not only that, but the heat is taken from every other part of the building, and doing no one any good, as it is all going outdoors. To demonstrate this, open the window, top and bottom, and hold a cloth fastened to a stick at the top, it will draw out. Hold it at the bottom. It will draw in. This shows that the heat is rushing out at the top and the cold rushing in at the bottom. Or place two thermometers, one at the top and one at the bottom; it will be found that the top one will register several degrees higher than the bottom one.

It is safe to say that there are not less than 1,000 tons of coal wasted every season in the city of Worcester by the practice of opening windows onto live radiators. It does not matter how wide windows are opened to air rooms, if only the steam be shut off. Each tenant who hears someone rapping for steam, if they will go at once and see that no windows open on live radiators, will save much heat to the other tenants, much fuel for the owner, much anxiety for the fireman, and much bad blood for all, so that the disposition of all will be improved.

Another bad waste is the practice of not snapping the catches when the windows are closed, to shut out the cool air that creeps in there.

Observing these wastes, if you do not get heat while the standpipes are hot, something is the matter with the air valves. At once call the attention of the owner or the fireman. If the standpipes are cold, the fault is in the boiler-room. Then go for the fireman, but do not try to shift the responsibility of your own neglect onto the poor fireman. He is between two fires, the owner for using so much fuel, and the tenants because they are not warm enough.

In all probability, there is wasted in this city, annually, from avoidable causes of firemen, owners and tenants, in the neighborhood of 1,500 to 2,000 tons of coal. Now the fireman who does not understand the cause of wastes, and the fireman who does understand but has not the stamina and courage to tell the owner and tenant of their faults, are not fit to be firing boilers. The owner who does not remedy wastes when pointed out to him, is not deserving of a good fireman, or tenants good or bad. And tenants who do not remedy wastes they know to be remediable by themselves, do not deserve to live in a heated house—a barn is the place for them.

These facts have not been acquired from books, but by the observations of 25 years' experience, and a little common sense, and the public is welcome to them.

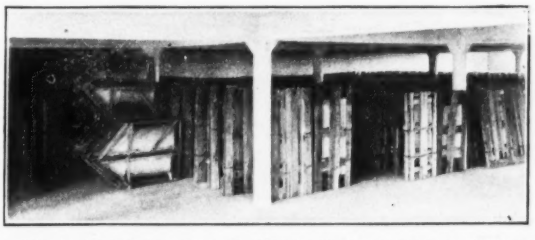


Illustration from new Portland, Oregon, branch of Crane Company, showing care of bath in stock.

Among the Wholesalers

WILL MOVE FROM DETROIT TO ABINGDON, ILL.

The American Sanitary Mfg. Company, of Detroit, Mich., manufacturer of plumbers' brass goods, has been reorganized with a capital stock of $60,000. Otto Ernst of the old company will be treasurer and manager, and John A. Peters, of Abingdon, Ill., will act as secretary and sales manager. The business will be moved to Abingdon, Ill., where a new plant is to be built at an expenditure of $45,000, including its equipment. A foundry, 50x90 feet, and a three-story machine shop, 50x160 feet, are now under course of construction. It is expected that the plant will be completed by March 1, 1910.

D. L. HAMILL CO. COMPLETES NEW ADDITION.

The D. L. Hamill Company, of Buffalo, N. Y., has completed its new addition to its buildings at Delaware avenue and West Eagle street. The new building is 55x83 feet, three stories and basement, of brick, slow-burning mill construction, with foundations and walls intended to carry two more stories if at any time it is desirable to add them. It has been constructed and arranged to meet the requirements of the company's business and gives it greatly needed additional facilities. The old store facing Delaware avenue has been remodeled into a handsomely finished showroom, in which also are offices for its officers. Excellent shipping facilities are provided on the Eagle street side and all the way through to Guthrie alley in the rear.

NEW PLUMBING HOUSE IN BUFFALO.

Another new plumbing supply house is to open its doors for business in Buffalo, N. Y., on January 1. It will be known as the Warren & Dellwardt Company, and it will be conducted by H. A. Warren, who has been with Dixon & Ballou for the past twenty-two years, and Frank M. Dellwardt, who has been with J. F. Weinheimer for the past nineteen years. The new company will be quartered in the spacious building at 109-111 East Seneca street and 76-78 Carroll street, which is 30 x 160 feet, four stories high. The new company will deal in supplies for plumbing, steam, gas and water, and it will be pleased to receive catalogues from manufacturers in these lines.

CRANE COMPANY SECURES LARGE TRACT OF LAND ADJACENT TO ITS GENERAL OFFICES AND PLANS LARGE ADDITIONS.

Crane Company has purchased more than half a hundred pieces of property in the immediate vicinity of its large plant and general offices at West Twelfth and Canal streets, Chicago. In addition to the knowledge that the Crane Company has been the purchaser of the holdings, the information also was given that the company, just as soon as two more pieces are obtained, will begin planning improvements in the way of additional manufacturing facilities, which are figured now to represent an investment of probably more than $1,000,000. It is expected that the remaining properties sought will be acquired within a few days, as negotiations have been pending for the purchase of the two pieces for some time and are said now to be practically closed. The work of erecting additional plants, it was said, probably will begin within a year. Just what the enlargements are to consist of could not be learned from persons in authority at the Crane company for the reason, as was explained, that the project so far has been confined almost entirely to the purchasing of the land. It would seem, however, that the expansion, whether immediate or ultimate, is to be gigantic. This becomes apparent by reason of the fact that property lying as far south of the present establishment as West Fourteenth and Canal streets has been taken, while

holdings with both north and south frontages in West Fourteenth place and with both east and west frontages in Canal street between Twelfth and Fourteenth streets also have been acquired. Some time since the Crane company acquired a large tract at Canal and West Fifteenth streets and on this site a new foundry is to be established by the firm at an estimated cost of half a million dollars.

COMPLETING THREE NEW BUILDINGS.

The Carborundum Company, of Niagara Falls, N. Y., manufacturers of abrasive materials, is completing the erection of two new buildings, one of which is 260x65 feet, four stories, of reinforced concrete construction, the first floor of which will be used for its chemical laboratory, advertising and printing departments; the second floor for general offices, lunch rooms for employees and private dining-rooms for officials; the third floor for machines for moulding and cutting its abrasive cloths and papers, and the fourth floor for paper-making machines. The other building will be used for manufacturing purposes mainly for its specialty department. It is also erecting a new addition to its crushing building, 75x75 feet, which, when completed, will give it a total factory floor space of 490,000 square feet, or nearly ten acres.

DODGE TO BUILD OTHER LARGE ADDITIONS.

Ground had no sooner been broken for an additional warehouse at the plant of the Dodge Manufacturing Company, at Mishawaka, Ind., than plans and specifications were in the hands of contractors, calling for an extension to the East foundry. This latest building will be 360 feet long by 80 feet wide. The walls call for brick, with steel trusses for the roof. Two cupolas, with capacities of about eight and ten tons per hour each, have been arranged for. An eight-ton electric traveling crane will handle the castings and heavy working material. In connection with the foundry addition, the contract provides for an elevated coke shed, 240 feet long by 15 feet wide, with a Dodge conveyor attachment for unloading cars. For charcoal and limestone, new buildings also are planned. These improvements, together with the main machine shop extension, will make it possible to double the present output, which has long been necessary owing to the demand for stock goods.

THE AMERICAN EXPOSITION IN BERLIN, GERMANY, IN 1910.

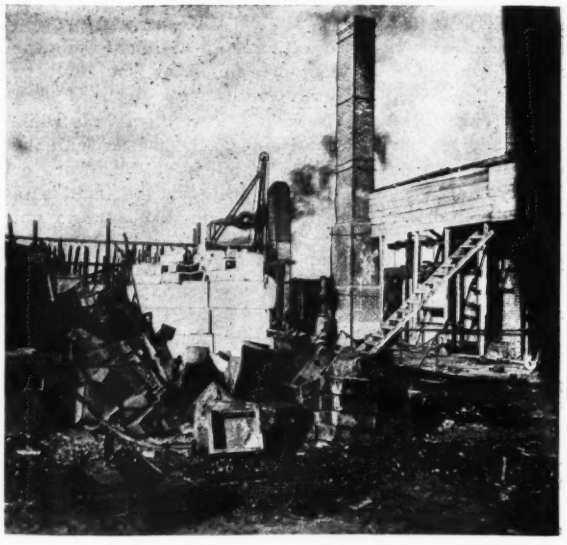
That America is to have a comprehensive and representative Exposition in Berlin, in 1910, is now assured. Manufacturers and business men throughout the country are displaying a lively interest in the undertaking, and applications for space have been received by the American committee from many states. The indications are that every branch of American progress will be shown at the Exposition. It is but natural that the United States should seek to hold an All-American Exposition in Europe; for our export trade in that direction has reached splendid proportions and it is constantly increasing. Our exports to Europe for the year 1908 reached the enormous sum of $1,270,016,773. It is also easily seen why the projectors of the Exposition selected Germany as the country in which to hold it, for that country alone receives $274,178,712 of our export trade, nearly one-fourth of the total amount going to Europe. It can be truly said of Berlin that that city is the commercial heart of Europe. Impetus has been given the Exposition enterprise by the recent appointment of former Governor David R. Francis, of Missouri, to the office of first vice-president of the American committee. Mr. Francis was president of the St. Louis World's Fair in 1904, and the success of that great Exposition was largely due to his wise management and active interest. There has just been issued by the American committee, whose offices are at No. 50 Church street, New York, an attractively arranged prospectus of the Exposition, which, in addition to outlining the objects and advantages of the enterprise, contains many photographic views of the Exposition Palace and portraits of the distinguished sponsors of the undertaking. It is interesting to note that the prospectus emphasizes the practical benefit of an exposition held in the heart of Europe rather than making an appeal to the national pride of prospective exhibitors. The booklet draws attention to the illustrious auspices under which the Exposition is to be held and lays stress upon the value this will have in enhancing American interests abroad. Prince Henry of Prussia, brother of the Emperor, is president of the German reception committee, while in this country J. Pierpont Morgan is president of the committees which are directing the work of selecting representative exhibits. Former Governor Francis is first vice-president, and John Wanamaker, of Philadelphia, is second vice-president.

PITTSBURG SANITARY MANUFACTURING COMPANY'S PLANT DESTROYED BY FIRE.

At 2:30 o'clock on a recent morning fire was discovered in the drying room of the plant of the Pittsburg Sanitary Manufacturing Company at Coraopolis, Pa., and before the fire department could get into action the building was a heap of charred timber and twisted iron. The night force was at work at the time but by one of those one-in-a-thousand chances not a man entered the drying room during the fifteen minutes that gave the fire a headway that could not be checked.

The speed with which the flames progressed made it a most spectacular fire, lighting up the surrounding country in a manner to rival the glare of the gigantic blast furnaces so numerous in the Pittsburg district. The tracks of the P. & L. E. R. R. which adjoin the plant, were blocked for some hours, causing a tie-up of the line.

Some idea of the damage caused can be gained through the larger of the accompanying cuts, showing the condi-



Ruins of the Plant of Pittsburg Sanitary Mfg. Co., at Coraopolis, Pa., Which Was Recently Destroyed by Fire.

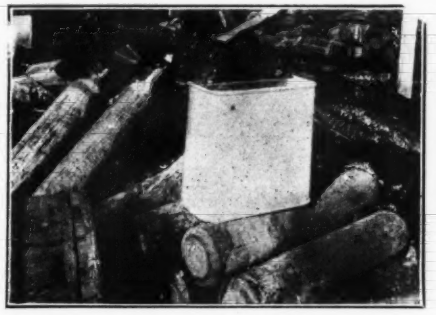
tion of the plant after the fire had completed its destructive work. The pile of enameled steel tanks in the centre of the picture shows the location of the stockroom. Some of the outer tiers of tanks were bent and blistered, but those in the centre passed through the conflagration unharmed, as is shown by the smaller cut of a tank taken from this pile.

The condition of this tank constitutes the only redeeming feature of this disastrous termination of an otherwise phenomenally successful business year, since it is a convincing proof of the quality of the company's product.

The ever-present humorous touch was furnished by the night watchman who had disappeared shortly after the fire was discovered. Some fears were entertained for his safety, as he had last been seen in the vicinity of the drying room where the fire was the fiercest. A hurried search and some questioning of the bystanders revealed the fact that he had gone home. Interviewed as to what he knew of the matter, he said he had been in another

part of the plant when the fire broke out and philosophically remarked, "I seen I couldn't do nothing so I went home and went to bed—no use of me hangin' around here.

The furnaces and presses were somewhat damaged but with characteristic energy the company began the work of reconstruction almost before the ruins had ceased smoking. The new plant will have double the capacity of the burned factory, which had been crowded to the limit to keep pace with the demand for the Steel King tanks. Every facility known to modern manufacturing



Enameled Steel King Closet Tank, Which Passed Through Disastrous Fire Without Being Damaged.

practice will be embodied in the new plant, the raw material going in at one end, emerging at the other end as the finished product packed for shipment.

This temporary setback will interfere with deliveries for a few weeks, but if the past is any criterion, the Pittsburg Sanitary Manufacturing Company will be back in the game in a short time and be occupying their former place in the front ranks of the country's manufacturing circles, a position which they attained by an aggressive advertising policy carried out in an intelligent manner through the medium of these and other columns.

CHICAGO PLUMBING SUPPLY BOWLING LEAGUE.

The Chicago Plumbing Supply Bowling League held its regular weekly tournament on Thursday evening last week on Schindler's bowling alley on Huron street, near Milwaukee avenue, at which the L. Wolff Mfg. Co.'s team again carried off the high team average for the three games, with 823⅓. A. Faehse of that team had the evening's high game with a score of 213, and he also secured the high individual average for the evening at 187⅔. The scores for the evening were as follows:

	First game	Second game	Third game
L. Wolff Mfg. Co.	849	790	831
Western Plumbing Supply Co.	661	671	740
Cameron-Schroth-Cameron Co.	770	790	799
Davies Supply Co.	680	729	668
Illinois Malleable Iron Co.	726	729	837
Republic Mfg. Co.	723	646	676
Federal-Huber Co.	821	831	810
Weil Bros.	682	633	723

MANITOWOC BRASS & FOUNDRY STARTS OPERATION.

The Manitowoc Brass & Foundry Co., of Manitowoc, Wis., has started operation in its new foundry at York and Ninth streets. Henry Stahl, for several years superintendent of the Aluminum Foundry Company in that city, is in charge of the new foundry. A new warehouse is being built near the foundry. Brass castings will be a specialty.

Buffalo, N. Y.—Whitby Bros. have engaged in the plumbing and heating business in a handsome plumbing store at 1002 Elmwood avenue. They would be pleased to receive catalogues from manufacturers and jobbers of plumbing and heating goods. They have secured the contract for installation of a steam heating system in the building at the corner of Elmwood and Potomac avenues.

Association News

WISCONSIN PLUMBERS WILL MEET AT SHEBOYGAN.

Sheboygan, Wis.—The annual state convention of the Master Plumbers' Association of Wisconsin will be held in this city on Tuesday and Wednesday, January 18 and 19.

CLEVELAND PLUMBERS GIVE ANNUAL ENTERTAINMENT.

Cleveland, O.—The Master Plumbers' Association of this city gave its annual entertainment and dance in its clubrooms on Wednesday evening, December 29th. A most pleasing and entertaining program was carried out, followed by dancing, and with card games for those who did not care to dance.

OHIO PLUMBERS WILL MEET AT YOUNGSTOWN

Cleveland, O.—The official call for the nineteenth annual convention of the Ohio State Association of Master Plumbers has just been issued by President J. L. Riley and Secretary Eb. Ellen, of this city. The convention will be held at Knights of Columbus Hall, South Hazel street, Youngstown, Ohio, on Tuesday and Wednesday, February 15 and 16, 1910. The attending delegates will convene on Tuesday morning at ten o'clock. Headquarters will be established at the Tod House.

ALBANY MASTER PLUMBERS' ANNUAL DINNER.

Albany, N. Y.—The Master Plumbers' Association of this city will give its annual reception and dinner at "The Ten Eyck" on Thursday, January 20, 1910. The guest of honor will be Isaac J. Brown of New York City, president of the New York State Association of Master Plumbers. The reception will begin at 7:30 and the dinner at 8 o'clock sharp. The tickets are $6 pro persona. An interesting program is being prepared by the committee of arrangements consisting of Frank F. Schimpf (chairman), 68 Washington avenue; James H. Doody, secretary; James Martin, James J. Gorman, Albion J. Eckert, T. E. Kerwin, Fred W. Ridgway, John E. Dugan and Thomas F. Nolan.

DENVER MASTER PLUMBERS ENTERTAINED BY MR. F. K. DIBLEY.

Denver, Colo.—F. K. Dibley, manager of the Denver branch of the L. Wolff Mfg. Co., of Chicago, recently gave a house warming and Dutch lunch at the new warehouse and place of business of that concern at 1624-1630 Wazee street. The affair was a most enjoyable event in every respect and reflected much credit upon Mr. Dibley. The guests were members of the Denver Master Plumbers' Association and representatives of the local supply trade. Over one hundred gentlemen sat down to the banquet tables, laden with the season's best and decorated with carnations and smilax, while a colored string orchestra rendered music and song. After the enjoyment of the repast and while cigars were in order, John R. Parry acting as toastmaster called upon the speakers and entertainers of the evening. Mr. Dibley was the first called upon and wished success and prosperity to all his guests. Chris. Irving, president of the Colorado Master Plumbers' Association; George E. Saaler, vice-president of the Denver Master Plumbers' Association; George E. Smith, past president of the Denver Master Plumbers' Association; A. J. Gumlick, treasurer of the Denver Master Plumbers' Association; Peter E. Snow, treasurer of the State Association; Thomas G. Hendrie, Fred Suess, P. H. Balfe, John H. Winters, past vice-president of the Denver Master Plumbers' Association; William C. Atkins and John J. McGee of the Atkins-McGee Supply Company, and E. T. Alcorn of the M. J. O'Fallon Supply Company, spoke and told stories in a very entertaining way. Peter Menzies, accompanied by the orchestra, sang "Annie Laurie" in his inimitable way. Later the guests adjourned to another room where it was announced

that "Kid" (Clayton E.) Lohr, champion of East 13th avenue, would meet "Shorty" (Henry O.) Fenske, champion of 19th street, in a boxing match to a finish. John H. Winters acted as referee and Peter E. Snow as timekeeper. After a number of gruelling rounds, as they came together once more, "Shorty" Fenske's foot slipped and he went down and the fight was stopped. But for this mishap "Shorty's" friends say he would be fighting yet. As it is against the law in Colorado, no decision was rendered. As the many guests finally wended their way home in the 'wee sma' hours they were all of the unanimous opinion that 'Mine Host Dibley' was a royal entertainer.

CONVENTION DATES.

January 18, 19 and 20, 1910.—Sixteenth annual meeting of the **American Society of Heating and Ventilating Engineers,** in New York City. The sessions will be held in Engineering Societies building, 29 West 39th street.

January 20, 21 and 22, 1910.—Fifth annual meeting of the **American Society of Inspectors of Plumbing and Sanitary Engineers,** at Trenton, N. J.

January 26 and 27, 1910.—Annual convention of the **Illinois Master Plumbers' Association,** at Springfield, Ill. Headquarters at the Annex of the St. Nicholas Hotel.

February 15 and 16, 1910.—Nineteenth annual convention of the **Ohio State Association of Master Plumbers,** at Youngstown, Ohio. The sessions will be held at Knights of Columbus Hall and headquarters will be established at the Tod House.

March 7 and 8, 1910.—Annual convention of the **Kansas State Association of Master Plumbers,** at Kansas City, Kans. Headquarters at the Grund Hotel.

March 8 and 9, 1910.—Annual convention of **New York State Association of Master Plumbers,** in New York City.

January 18 and 19, 1910.—Annual convention of the **Master Plumbers' Association of Wisconsin,** at Sheboygan, Wis.

TRY TO FIND CAUSE OF WATER PIPES' RAPID DECAY.

Nashville, Tenn.—Several master plumbers in this city and Geo. W. Reyer, superintendent of the water works, are at present engaged with the solution of the problem of the rapid decay of a number of the water service pipes attached to the city's water mains and at the present writing two causes have been found, either of which is deemed probable. The master plumbers hold that the solution used in the purification of the city's water, a compound of which sulphate of alumina forms the base, has acted on the iron pipes with disastrous effect, causing a large number of them to be renewed at considerable expense. They claim that the action of the compound causes the pipes to rust unduly and blame this against the waterworks system. Refuting this contention and offering a plausible substitute, Superintendent Reyer holds that the alum has little or no effect on the metal, first, because the process in which it is used takes place in the reservoir, and secondly, that the same formula is being used in many other cities and has failed to develop the qualities which it is alleged to have developed in this city. Mr. Reyer is of the opinion that the trouble is caused by electrolysis and in all probability a test will be made to determine the exact cause. The stray electric current which it is thought causes the action of the pipes known as electrolysis, is alleged to result from the single trolley system used on the street railway system. This complaint is made wherever this single line system is in vogue. It is also claimed that an inferior grade of piping is being used by some house builders which, due to poor material, is easily acted upon by ordinary water. Plumbers contest this theory and the dispute may have to be settled by a test held jointly, trying the several kinds of piping used for service purposes.

Memphis, Tenn.—The plans for two public comfort stations which the park commission will build in Court Square and Confederate Park have been received from the park board's consulting architect, Geo. E. Kessler. These plans have already been approved by the commissioners, and at the next meeting of the board bids for their erection will be ordered. The stations will cost nearly $10,000 each.

Plumbing Legislation

NEW PLUMBING ORDINANCE FOR KANSAS CITY.

Kansas City, Mo.—Evidently the public in this city is not very deeply interested in the proposed ordinance for the regulation of the installation of plumbing and heating systems in homes and buildings, for there has been no response to the call from the upper house of the council committee for the expressions of approval or objection. It is therefore expected that the ordinance will be passed at the next meeting of the council. This ordinance provides that the installation of plumbing and heating systems must be performed by men adept in their respective trades, that they must bear the endorsement of a board of examiners to be appointed by the city as to their capabilities and that these examinations shall be held as often as once a year.

TO AMEND AKRON PLUMBING CODE.

Akron, O.—A tentative plumbing code embodying the provisions advocated by both the board of health and the Master Plumbers' Association of this city will be offered to the city council at its next meeting as a result of the conference between the chamber of commerce committee, a committee from the city council and others held last week at the headquarters of the chamber of commerce. The meeting was also attended by H. J Luff, sanitary engineer, of Cleveland, who assisted in drafting the Cleveland plumbing code, which has been termed a model of its kind by experts in other places. Mr. Luff explained the features of the code and recommended that the general scheme of the instrument be embodied by the Akron council. Joseph Dangel, representing the chamber of commerce, acted as chairman. Secretary Vincent C. Stevens and John C. Klein were also members of the chamber of commerce committee. Councilman L. D. Seward and T. C. Marshall represented the city, Dr. L. R. C. Eberhard, the board of health, and Will Voris, the plumbing inspector's department. Among the plumbers present were Walter Kirn, H. P. Cahill, Oliver Hoffman, Frank J. Maloy, J. A. Forbes, L. J. Heffernan, H. W. Limbert and others. Milton E. Harpster, architect, also took part in the discussions. After the meeting had progressed for a time it resolved itself into a committee of the whole, with Dr. Eberhard as chairman. This was done to allow the board of health to exercise its authority in the matter and to allow the members of that department to insert some of their ideas into the proposed code. The board and Inspector Voris have prepared an outline of a code which follows the plan of the Cleveland code with such changes as are necessary to fit the needs of Akron. The plumbers now propose to insert a few sections which they say are necessary and will have the whole measure ready for introduction at the council meeting next week.

TO REVISE ALTOONA PLUMBING LAW.

Altoona, Pa.—It is expected that this city will have a plumbing inspector and a board of plumbing examiners in the near future. A move in this direction has just been started in order to comply with the state law governing the operations of plumbers in third class cities. Some two years ago the local board of health, which is required to register all plumbers before they can secure a license from the water department, asked the city council for an appropriation for the salary of a plumbing inspector, but the appropriation was never made and the board of health has had to register all plumbers who applied, in spite of the fact that it had no means of knowing whether the applicants were competent plumbers or not. On May 14, 1909, an act was approved by the governor, making the act of June 7, 1901, relating to the governing of plumbers in second-class cities, operative for third-class cities, and under its provisions the local councils have no choice, but must provide for a plumbing inspector and board of examiners. Some days ago Mayor Hoyer wrote to City Solicitor T. C. Hare, asking for information on the subject, and Mr. Hare has replied that the act governs Altoona and that the city must have a plumbing inspector, as well as a board of examiners. The inspector will be elected by the board of health, and the board of examiners, which shall consist of

the health officer, the plumbing inspector and two competent plumbers, will be appointed by the mayor. The immediate revision of the law regarding plumbers, the appointment of a plumbing examining board and the election of a plumbing inspector is now being considered by the mayor, the city solicitor, the board of health and a committee from the Master Plumbers' Association of this city. Under the state law, master plumbers or plumbing firms must pay a registration or license fee of $5 a year and their journeymen or other employes must pay a fee of 50 cents a year, thus making the position of inspector self-supporting, as these fees will go far toward paying his salary. While the inspector who will be appointed as a result of this movement can not receive a salary for the rest of this fiscal year, as no appropriation was made, it is likely that arrangements can be made to pay him out of the fees.

The Metal Market

IRON MARKET COMPARATIVELY ACTIVE FOR HOLIDAY SEASON.

Cincinnati, O.—It is rather against the usual order of things, but this week there has been more inquiry for pig iron than for some weeks past, report Matthew Addy & Company. As a rule the holidays see a cessation of activity in the iron market. It is the season when the mills and foundries shut down for inventory and repairs and when a truce is sounded between buyers and sellers—so little is expected. Accordingly it is a pleasant surprise to find that there is some little interest in the market and transactions of moderate size. Prices have been made attractive, but it is a question in our minds whether prices have much to do with the current purchasing. We are rather of the opinion that the iron is bought because it is really needed and a good deal of it is needed in a hurry. As for the year that is closing, it has been good and bad. It started gloomily enough, and by June prices had been smashed to small pieces. But since that time there has been a decided change. Prices have advanced from $3.00 to $4.00 a ton and the volume of business has been very large. There is only one opinion as to the year that is coming and that is highly optimistic. It is regarded as certain that 1910 will be a year of heavy tonnage and of satisfactory prices. We are thought to be starting on a long ascending statistical curve of prosperity that will last for several years. It is to be noted that in spite of the severe winter weather the railroads are doing well, and while there is some complaint of slow deliveries, yet things are much better than in previous years under similar conditions.

NEW YORK METAL MARKET, DECEMBER 27.

Copper, Prime Lake	$13.75
Copper, Electrolytic	13.50
Lead	4.62½
Spelter	6.30
Antimony, Cooksons	8.37½
Straits Tin	34.00

CHICAGO IRON MARKET, DECEMBER 28.

Lake Superior Charcoal	$19.50-$20.00
Southern, No. 2 Foundry	18.35- 18.85
Northern, No. 2 Foundry	19.00- 19.50

December 28, 1909.

Foundry iron was the same as the week previous.
$1 more a ton than year previous.
Copper was ¼ cent more a lb. than month previous.
¾ cent less than the year previous.

NEW YORK METAL MARKET.

New York.—Dealers' buying prices are as follows:

Heavy crucibled copper	$12.37½ to	$12.62⅜
Light copper	10.87½	11.12½
Plumbers' cocks and faucets	9.50	9.75
Heavy lead	4.30	4.40
Tea lead	4.00	4.10
Solder joints	6.75	7.00
Mixed pewter	....	21.00
Block tin pipe	31.00	32.00

CHICAGO OLD METAL MARKET.

Dealers' buying prices are as follows:

Clean heavy copper and wire	$12.50
Light copper	11.25
Heavy composition	12.00
Heavy yellow brass	12.00
Light brass	9.00
Heavy lead	4.00
Tea lead	3.60
Block tin pipe	28.00

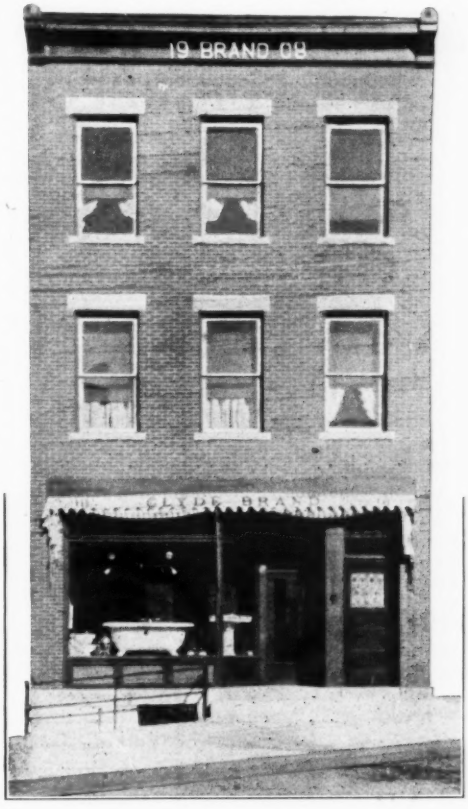
TREASURY DEPARTMENT OFFICE.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor, until 3 o'clock p. m. on February 14, 1910, for the construction (complete) of the U. S. Post Office at Lead, South Dakota, in accordance with the drawings and specifications.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor, until 3 o'clock p. m. on February 10, 1910, for the extension (including plumbing, gas piping, heating apparatus, electric conduits and wiring and standard clock system), of the United States Post Office and Court House at Lynchburg, Virginia., in accordance with the drawings and specification.

Washington, D. C.—Sealed proposals will be received at the office of Supervising Architect James Knox Taylor, until 3 o'clock p. m. January 25, 1910, for the extension, remodeling, etc. (including plumbing, gas piping, heating apparatus, electric conduits and wiring), of the U. S. post office at Pawtucket, R. I., in accordance with the drawings and specification.

Thomas F. Dolan, president of the Master Plumbers' Association of Denver, Colo., who has been confined to his home in that city for several weeks, is recovering and will soon be able to attend to his business.



Clyde Brand's New and Up-to-date Plumbing Establishment at No. 111 Walnut St., Morgantown, W. Va.

LOCAL NEWS

MASSACHUSETTS.

Taunton, Mass.—J. E. McGlynn has secured the contract for plumbing a house in Cooper square.

Taunton, Mass.—James Nagel, formerly located at 26 Cohannet street, has moved his plumbing and heating business to larger and more convenient quarters at 26 Cohannet street.

North Adams, Mass.—Joseph McNine, a local plumber, is preparing to open a plumbing establishment of his own on Bank street. Mr. McNine has been engaged in the plumbing business for a number of years and is a skilled and competent mechanic. He already has several contracts on hand or in sight.

Concord, Mass.—J. R. Cummings has the contract for plumbing and heating the handsome new residence of George Shaw. The Cummings Plumbing and Heating Company, which is to succeed to the business of Mr. Cummings is soon to open at his present stand, at 6 Walden street, taking over all contracts and work on hand.

Taunton, Mass.—Cunnings & White is the name of a new firm which has opened a plumbing, heating and sheet metal business at 520 Somerset avenue. Both members of the firm are experienced men in the business, and are meeting with splendid success. They report four heating contracts, two for steam and two for hot water. They also have the contracts for the plumbing in five new dwellings.

Leominster, Mass.—Clerk Fredson N. Gray, of the local board of health, has prepared a petition which is to be presented to the state board of health, asking that a suitable set of rules and regulations as regards plumbing inspection be framed for the town. As soon as these are accepted by the town a regular plumbing inspector will be appointed. The town has had no inspector for three years.

BLANK FOR REPORT

Awards of Heating or Plumbing Contracts

(Cut out, fill in and mail promptly)

DOMESTIC ENGINEERING
323-325 Dearborn St., Chicago

We have been awarded the

Plumbing Contract _____

Heating Contract _____

Kind of Building _____

Amount of Contract _____

Owner's Name _____

Architect's Name _____

Address _____

Our Own Name _____

Address _____

PENNSYLVANIA.

Pittsburgh, Pa.—R. B. Eaton, of the East End, this city, has been awarded the contract for plumbing five fine new residences that are now being built here for A. C. Read.

Pittsburgh, Pa.—Feld Plumbing Company, of 4039 Penn avenue, has secured the contract for the plumbing in the apartment building which is being erected for J. B. Phillips at 810 to 812 Bryn Mawr road.

Pittsburgh, Pa.—The contracts for the plumbing systems for three handsome new residences that are being built this winter in the East End for M. J. Eastman have all been awarded to Charles Ruckel, Penn avenue, this city.

Pittsburgh, Pa.—The contract for the plumbing system in the new residence being built here for E. W. Watson has been awarded to McMeekin & Sunderland, 4702 Penn avenue, this city. Two handsome bath rooms will be installed, as well as a kitchen and a laundry.

WISCONSIN.

Fond du Lac, Wis.—The plumbing firm of Heyde & Boege is now located in its handsome new quarters in the Coliseum building.

Wausau, Wis.—A. B. Wheeler & Son have been awarded the contract for the installation of a steam heating system in the Antigo public library building. Consideration, $1,732.75.

Sheboygan, Wis.—The Optenberg Iron Works, of Sheboygan Falls, Wis., have been commissioned to construct and install the new steam heating system in the city hall at Port Washington, Wis.

Milwaukee, Wis.—The dissolution of the firm of Starck & Heiden, who established a plumbing and heating business at 120 Mason street some months ago, is announced. Both members of the firm are now employed in the plumbing establishment of A. J. Maag.

Racine, Wis.—The J. I. Case Threshing Machine Co., of this city, will next spring build a central heating plant, to supply all of the shops comprising the mammoth Case works, including the plow works, threshing machine works, wagon, and agricultural machinery plants.

Antigo, Wis.—The Antigo Plumbing Company announces that C. S. Leykom has become associated with this concern and will be president of the company. The business will be continued in the present quarters at 1037 West Fifth avenue. Robert Wojan, vice-president of the company, continues as general manager.

MICHIGAN.

Hudson, Mich.—Ralph W. Armstrong has opened a plumbing establishment in the rear of the store formerly occupied by Armstrong & Munger.

Hudson, Mich.—C. E. Causel, of Sturgis, Mich., has purchased the stock of the plumbing firm of Armstrong & Munger, which recently made an assignment for the benefit of its creditors. Mr. Causel moved the stock to his establishment at Sturgis.

Pontiac, Mich.—H. L. and C. H. Monroe have purchased C. J. Kelly's plumbing and heating business at 71 North Saginaw street, and the transfer took place last week. H. L. Monroe will manage the business. He has been connected with the city water works department since 1895. Mr. Kelly intends to enter the automobile business.

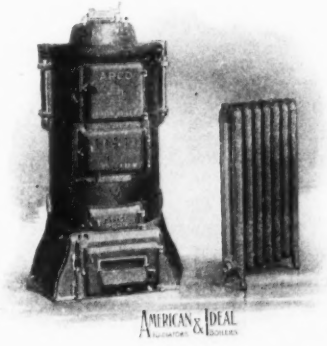
Clarksville, Tenn.—Walter Bard is making arrangements to open a plumbing establishment on Second street.

Bristol, Conn.—Adams & Arnold have been busy the past few weeks installing heating systems. They have installed one in James McKeirnan's new house on West street, one in the new house of Wallace L. Hart on Laurel street, and will install another in the new house of Charles E. Mallory on Woodland street.

Holton, Maine.—W. H. Gray and Catherine Gray, doing a stove, tinware and plumbing business under the firm name of W. H. Gray and Company, have dissolved partnership by mutual consent. G. H. McBride has bought the interests of Catherine Gray and hereafter the business will be carried on under the name of Gray & McBride Company.

Greetings

THE last entry made—and the old leaf of 1909 is filled and balanced. On the fresh, white page of the new year we write across the top our heartiest greetings to the Trade, with best wishes for another season's prosperity during the year 1910.



The manufacturers of IDEAL Boilers and AMERICAN Radiators thank you for your generous support during the past twelve months and will strive to merit your favors in 1910 by better goods, better service and accommodations than any one past year has brought out.

AMERICAN & IDEAL
RADIATORS BOILERS

AMERICAN RADIATOR COMPANY

General Offices, 282-286 Michigan Ave., Chicago.

New York	Cincinnati	Cleveland	Atlanta	Bradford, Ont.	Denver
Philadelphia	Boston	Milwaukee	Minneapolis	Seattle	St. Louis
Pittsburg	Buffalo	Indianapolis	Kansas City	Omaha	San Francisco
Washington					

NOTES FROM THE WEST.

Norwood, Minn.—Hardell Bros. have secured the contract for the installation of a hot water heating system in the Volkman hotel.

Muskogee, Okla.—H. E. Condon has purchased a lot, 37½ feet wide, on South Third street, on which he intends to erect a three-story building, to be occupied by his plumbing establishment.

Aspen, Colo.—James C. Johnson has opened a plumbing establishment here. He is a member of the Colorado Master Plumbers' Association and he would like to receive catalogues from jobbers and manufacturers of plumbing goods.

Winterset, Iowa.—G. B. Kapus has been awarded the contract for the heating and plumbing in Dr. J. H. Wintrode's residence. Consideration, $1,200. Mr. Kapus also has secured the contract for the installation of an up-to-date plumbing system in Wm. Surley's residence.

Carthage, Mo.—All the plumbers in town are happy these days because they are so busy that they are up to their eyes in work. A cold wave like the present one always brings them increased business, and on top of this condition, the rush of orders for making connections with the municipal water works system is very large. No workman can accomplish so much on an outdoor job in weather like that of the past week, as he can when the temperature is milder, and as the ground is frozen six inches deep, progress of plumbing operations is not rapid.

Albany, N. Y.—H. Shoor & Son have moved their plumbing and heating establishment from 104 Hamilton street to 80 Trinity place.

Portland, Maine.—The city hall building commission has called for new bids for the plumbing and electrical work in connection with the new city hall building now under process of construction, those first received having exceeded the appropriations. The bids will be received at the office of Mayor Adam P. Leighton until January 3, 1910, at 2 o'clock, when they will be opened and the contracts awarded. The specifications have been revised considerably since last made public.

Locke, Stevens & Co.'s troupe, in their one-act specialty entitled "Showing up Naturo Closets," staged especially for the benefit of Domestic Engineering. It is needless to add, it is not a colored troupe, for Geo. E. Stevens, the star in the play, is one of the whitest men who ever trundled a grip out of Boston. As you will observe, he always wears the smile that won't come off. Mr. Stevens is thoroughly familiar with his lines, as he has talked Naturo ever since its inception. The act has made a great hit throughout New England, except perhaps with the hotel porters, who are inclined to look askance at the outfit, as it weighs several hundred pounds, more or less. Strenuous? Yes, just a little.

FRISCO MASTER PLUMBERS PASS IMPORTANT RESOLUTION.

San Francisco, Cal.—From the headquarters of the Association of Master Plumbers of San Francisco, Inc., has been issued the following notice to Master Plumbers:

To the Members of the Association of Master Plumbers of S. F., Inc.

Gentlemen:—This is to officially notify you that on Friday evening, December 3, 1909, the Association adopted the following resolution:

"Resolved, That after February 1, 1910, we will not estimate for, nor accept a job of any kind from, a general contractor as a sub-contract. We will estimate only for architects or owners, and all contracts or jobs must be let or given direct to the plumber."

Very respectfully,

The Association of Master Plumbers of San Francisco, Inc.

Board of Directors—Frank J. Klimm, president; A. J. Wilson, W. E. Burnham, Wm. Buick, Geo. Guthrie, E. Grundy, Jos. Ahlbach, S. Petersen, A. Coleman, F. Lyman, J. E. Britt. John L. E. Firmin, secretary

To building contractors the association says: "The Association believes that the practical application of this resolution will very greatly eliminate those evil practices and consequences from which you, as a contractor, in common with the architect, owner, master plumber and other interested parties, now suffer; and that the segregation of plumbing contracts will create conditions more equitable, less fractional and such as will highly benefit all concerned in the building industry. Therefore, we respectfully ask your favorable consideration and co-operation."

J. L. E. Firmin, secretary of the association, says: "In drawing up this resolution the association does not wish to throw any discredit on the contractors or anyone else. It simply wishes to do what the lien laws of the state have failed to do, to guarantee the compensation of the master plumber. The majority of contractors of this city are men of honor, but the point in discussion is that the present system is vitally wrong and needs correction, and as the state lien laws give little or no protection to the plumbers, the latter decided to take the matter into their own hands."

SAN FRANCISCO HAS NEW BUILDING LAW.

San Francisco, Cal.—The building ordinance, codifying all the plumbing, building and tenement house legislation of the city, was finally enacted by the supervisors December 22. This places the regulations in orderly, concise and comprehensible form, and will be a great convenience to all the building trades.

San Diego, Cal.—The San Diego Sheet Metal Works has been awarded the contract for the installation of a steam heating and ventilating system in the new school building at Escondido, Cal.

Los Angeles, Cal.—D. C. Armbrust, of this city, has secured the contract for the installation of a steam heating system in Mary W. Longstreet's new building at 88 Hill street. Consideration, $1,200.

Los Angeles, Cal.—Newell Bros. have been awarded the contract for the installation of a steam heating system in the Annex Hotel in this city. Morgan & Walls, architects, made the plans for this hotel.

Pasadena, Cal.—W. F. Creller of this city, has secured the contract for the installation of an up-to-date plumbing system in the new fifteen-room residence which is being erected at San Raphael Heights for H. W. Bailey. The consideration is $3,190. Architects, Hunt & Grey, Union Trust building, Los Angeles, made the plans for this residence.

San Francisco, Cal.—While plumbing contracts of late have not been very large in number there have been some very good ones left. At the present time there are a number of club buildings being erected in this city and as many of these are equipped with plunges and shower baths the plumbing contracts are quite heavy. Among the buildings of this character are the new Y. M. C. A. building on Golden Gate avenue and the Olympic Club on Post street. The Pacific Union Club is also letting contracts for work on its fine new home on Nob hill on the site of the old Flood residence.

San Francisco, Cal.—J. J. Houston has secured the plumbing and gas fitting contract for the building on Franklin and Lily streets from the Stroecker Company.

San Francisco, Cal.—Flood & Hammond has secured the contract for the plumbing work on the three-story frame building on the corner of Twenty-fifth street and Potero avenue, for $2,245.

Los Angeles, Cal.—The Machinery & Electrical Company, of this city, has been awarded the contract for the installation of a steam heating system in the new Presbyterian Church at Long Beach, Cal. The consideration is $4,000.

San Francisco, Cal.—The White Investment Co. has let the contract to the Vacuum Engineering Co. for an electrical operated vacuum cleaning system for the ten-story building on the northeast corner of Battery and California streets, for $1,300.

San Francisco, Cal.—The San Francisco Board of Public Works has awarded the heating and ventilating contract for the new Hall of Justice to the Lennig-Rapple Engineering Co. for $28,692, and the plumbing contract to Wittman, Lyman & Co.

San Francisco, Cal.—J. Spargo has secured from the Pioneer Investment Co. the contract for building a reinforced concrete swimming and plunge tanks, with necessary pipe openings in the buildings, in the Jefferson Square building on Golden Gate avenue.

Fresno, Cal.—Bids for the heating apparatus for the Annex of the Lowell primary school in this city were opened this week, but the awarding was deferred until the next session of the Board of Education. The bids were: Pacific Blower and Heating Co., $5,025; Barrett, Hicks & Co., $5,150; Morgan & Co., $5,593.

San Francisco, Cal.—The John G. Sutton Company, which recently purchased a large lot at Elizabeth and Folsom streets, has commissioned Architects Sutton & Weeks to draw plans for its new warehouse, shop and office. Its heating and plumbing business has grown to such an extent that additional room has been made necessary.

San Francisco, Cal.—The plans of the new city administration for municipal buildings are taking definite shape. It is announced that if possible a temporary building will be erected after the first of the year to house the city offices until a new city hall can be built, which will be the next work to be undertaken. Plumbing and heating contractors are watching developments along this line, as some large jobs will be required in connection with both temporary and permanent buildings.

San Francisco, Cal.—The holiday season is having a rather depressing effect on the plumbing trade, and while things are far better than last December, there is still plenty of room for improvement. Business is expected to pick up materially after the first of the year, however, as there is quite a rush to get business buildings completed before the destruction of the temporary buildings is carried out next May. Business in the steam heating line is quite brisk, notwithstanding the holiday season. The winter is unusually cold, and small heating jobs for residence buildings are numerous, in addition to the large contracts occasionally coming out for public and business buildings. There seems to be plenty of money available at present for building operations, but supply dealers say that collections are coming in very slowly from both country and city trade.

Oakland, Cal.—The annexation of a number of suburbs of this city, decided upon at the recent election, means that there will be an increased amount of plumbing work done in those places from now on and that the use of much cheap material will be stopped. At the present time the sanitary requirements in these outlying districts are not very strict and many property owners have purchased their own plumbing supplies and installed them. In some places there are no sewer systems, as yet, and sanitation is badly needed. These wants will be attended to immediately and Oakland plumbers are expecting to get a large amount of work from districts where they have previously have had but little. Oakland now has more than double the territory she formerly had with a much greater population also and there must be an addition to the present force of plumbing inspectors in order to cover the territory in a thorough manner.

To Our Trade

In wishing you the compliments of the season, we wish to add that we are grateful for the loyal patronage we have enjoyed during the past year and take this opportunity to thank, for their co-operation, the loyal users of

CAPITOL BOILERS AND RADIATORS

We pledge the assurance that we will in the future continue to keep "Capitol" goods the standard of quality and practical merit.

United States Heater Company.

GENERAL OFFICE AND WORKS: DETROIT

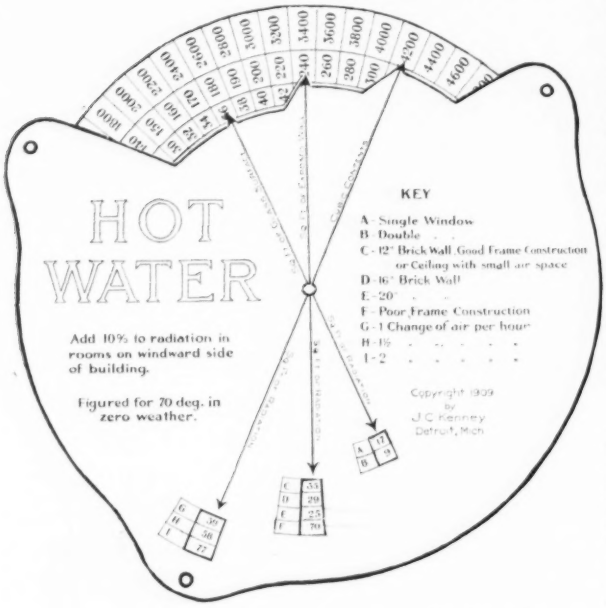
BRANCHES: NEW YORK CHICAGO OMAHA DETROIT

SALES AGENCIES: ST. LOUIS DENVER MINNEAPOLIS DULUTH

With the Makers

MECHANICAL CALCULATOR FOR FIGURING STEAM AND HOT WATER RADIATION.

That any one can figure the amount of radiation required for either steam or hot water heating as accurately and in less time than the best heating engineer is the claim made for the novel device illustrated herewith, by the manufacturers, The Kenney Co., Detroit, Mich. The method of its operation can be comprehended almost at a glance. By moving the disc on the back to the points indicating the proper cubic contents, square feet of exposed wall, and square feet of glass surface, the amount of radiation required is easily computed by


HOT
WATER
Add 10% to radiation in rooms on windward side of building.
Figured for 70 deg. in zero weather.
KEY
A—Single Window
B—Double " "
C—12" Brick Wall, Good Frame Construction or Ceiling with small air space
D—16" Brick Wall
E—20" " "
F—Poor Frame Construction
G—1 Change of air per hour
H—1½ " " " "
I—2 " " " "
Copyright 1909 by J. C. Kenney Detroit, Mich.

reference to the figures appearing at the openings opposite the lower ends of the arrows. The device is so simple that its use can be learned in five minutes, is the claim. Obviously a device of this kind will soon pay for itself in accurate results and in time and money saved. Full particulars may be had by mentioning this article when writing the manufacturers.

Chester, Pa.—Efforts are being made to have a department of plumbing inspection established in this city in connection with the board of health.

Syracuse, N. Y.—The Municipal Heating Company has secured the contract for the installation of a heating plant in the city hall on its bid of $2,999.40.

Tucumcari, N. M.—S. Anderson of this town has just been admitted to membership in the Colorado Master Plumbers' Association. He would like to receive catalogues from manufacturers and jobbers of plumbing supplies.

Charlotte, N. C.—The Piedmont Plumbing Company, of this city, has been awarded the contract for the installation of a sewerage system at the Colored A. & M. College. The plumbing system will be installed by Adams & Hunt.

Atlantic City, N. J.—David H. Moore, of 10 North Maryland avenue, has been awarded the contract for the installation of plumbing and gasfitting systems in the new thirty apartments building on St. James place. The consideration is $4,000.

Denver, Colo.—Henry O. Warlum, formerly connected with his brother, W. O. Warlum's plumbing establishment at 315 Sixteenth street, has purchased L. McDonald's plumbing business at 2312 Colfax avenue and secured his membership in the Denver Master Plumbers' Association.

The Shop Bookshelf

Being a brief mention of late publications which are worthy of special notice because of their unusual interest to the trade. They should be on "The Shop Bookshelf" in every plumbing and steam fitting establishment for instant reference. A free copy of any publication referred to under this heading may usually be had by mentioning "Domestic Engineering" when you write.

From the Union Sanitary Mfg. Co., Noblesville, Ind.: A miniature porcelain enameled bath tub 8½ inches long and 2¾ inches high bearing the manufacturer's familiar green and gold guarantee label. As a sample of the quality of material and finish of the Union Sanitary product this little tub is sure to make a very favorable impression upon those to whom it is sent.

From the H. W. Johns-Manville Co., New York: A neat 3½ ins. x 6 ins. booklet of 24 pages on "The Insulation of Pipes and Boilers." Further than giving complete, well illustrated little talks on a number of the various pipe coverings and insulating materials manufactured by this firm, the booklet gives some interesting as well as very pointed figures, showing just how large the fuel waste is in a plant operating with bare pipes, and how much can be saved by proper covering of same.

From the California Plumbing Supply Co., San Francisco, Cal.: Catalogue "A," being a supplement to the firm's regular catalogue. The book has forty-eight pages, is substantially bound in heavy cover stock, the printing is first class and the half-tone illustrations of the several special fixtures shown are of the highest order. Six illustrations of model bath rooms fitted with appropriate sanitary plumbing fixtures is a feature of the book which contains suggestions of interest to architects and builders.

From the Albert Schade Co., Philadelphia: Steam Specialty Catalogue No. 1, a neat cloth bound book, 6 ins. x 9 ins., 186 pages, cover stamped in gold bronze. In presenting this book to their friends and the trade in general the company has endeavored to give only as much information as is necessary for the proper selection of a suitable device for the majority of conditions. As far as thought consistent with wisdom, only one accepted standard make of each article listed is shown. The indexing of this book has been well done, making it handy for reference. The illustrations and typographical work on this book also deserve commendation, as they are much above the average in books of this kind. From the standpoint of both the useful and ornamental this catalogue is an important addition to the shop bookshelf.

From the Knott-Van Arnam Manufacturing Company, Ft. Wayne, Ind.: A large wall calendar, twenty-seven inches high by twenty inches wide, suitable for hanging up in office or workshop. The familiar K-VA trademark appears at the heading, in red, the numerals are in black, two inches high, and can be read easily for quite a distance. On either side and a little below the trade-mark is printed the monthly calendar for the month previous and the month following. This makes a very convenient and useful calendar. It is nicely printed on good paper with good ink and on the whole makes a very attractive piece of advertising matter, one that will be appreciated and used by plumbers everywhere.

PATENTS.

942,972, Regulating valve—Stephen A. Palmer, Kansas City, Mo.

942,978, Flushing apparatus—Alfred C. Snell, Saltash, England, assignor to William Hatfield Dodge, Montclair, N. J.

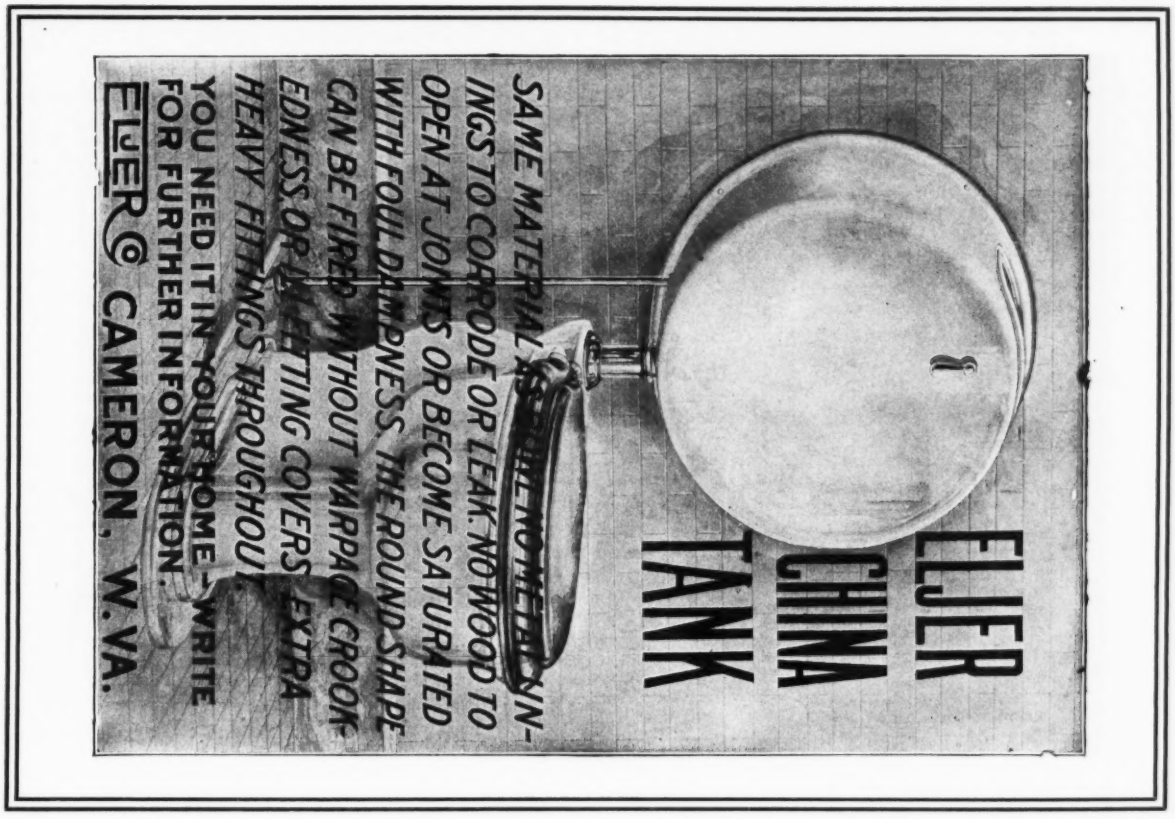
942,982, Boiler cleaning device—Adolph Thomas and Edgar Thompson, Minnesota Lake, Minn.

943,004, Heat retainer—Warren T. Converse, Aurora, Ill.

943,040, Ammonia refrigerating apparatus—Thomas C. McKee, Chicago, Ill.

943,056, Blow-off cock—John B. Youngblood, Cleveland, Ohio.

943,123, Nipple flange—Howard W. Reynolds, New York, N. Y., and John A. Smith, Arlington, N. J.


ELJER
CHINA
TANK
SAME MATERIAL AS TOILET BOWL—NO METAL LININGS TO CORRODE OR LEAK. NO WOOD TO OPEN AT JOINTS OR BECOME SATURATED WITH FOUL DAMPNESS. THE ROUND SHAPE CAN BE FIRED WITHOUT WARPAGE OR CROOKEDNESS OR A CASTING COVERS EXTRA HEAVY FITTINGS THROUGHOUT.
YOU NEED IT IN YOUR HOME—WRITE FOR FURTHER INFORMATION.
ELJER CAMERON, W. VA.

943,131, Flushing device—Carl H. Zwermann, Kalamazoo, Mich.

943,189, Steam generator, superheater and feed-water heater—Frank A. Haughton, New York, N. Y.

943,241, Sanitary cabinet for drinking cups—Luke W. Farmer, Somerville, Mass.

943,404, Faucet or Valve device for wash basins and the like—Tom A. Hasek, Cleveland, Ohio, assignor of one-half to Mike J. Hasek, Cleveland, Ohio.

943,416, Hose coupling—Chas. E. Judkins, Coeur d'Alene, Idaho.

943,451, Check valve—James G. Parker, Washington, Pa.

943,458, Lavatory—William Podmore, Trenton, N. J., assignor to Trenton Potteries Company, Trenton, N. J., a corporation of New Jersey. Among the eight claims made for this invention the two most notable are: "A lavatory having a bowl provided with a T-shaped outlet, the horizontal portion thereof having a greater cross-sectional area than the vertical portion; substantially as described. A lavatory having a soap receptacle, a flush spout for said receptacle, and a pump arranged to force water from the spout; substantially as described."

943,484, Article of earthenware—Edward C. Stover, Trenton, N. J., a corporation of New Jersey. Among the Trenton, N. J., assignor to the Trenton Potteries Company, claims made for this invention are the following: "A new article of manufacture consisting of a single fired bath-tub of earthenware having passaged walls and finished both inside and out by one firing operation. The herein described process of manufacturing articles of earthenware which consists in firing and finishing an article of earthenware with passaged walls on both the inside and outside by one firing operation. The herein described process of manufacturing articles of earthenware which consists in molding an article of earthenware with passaged walls and in firing and finishing the said article both inside and out by one firing operation."

943,526, Faucet—August Engel, Milwaukee, Wis., assignor to Milwaukee Brass Manufacturing Company, a corporation of Wisconsin.

943,558, Molding apparatus for pipe joints—John F. Milam, Rome, Ga., assignor of one-half to William C. Ungland, Rome, Ga.

943,617, Gas heating apparatus—William E. Lawson, Homestead, Pa., assignor to Lawson Manufacturing Company, Homestead, Pa., a corporation of Pennsylvania.

943,630, Push button mechanism for flush valves—Walter J. Frost, Kenosha, Wis., assignor to the Frost Manufacturing Company, Kenosha, Wis., a corporation of Wisconsin. The broadest of the four claims made for this invention reads as follows: "The combination with a flushing tank having a discharge outlet, of a valve controlling said outlet, a connecting rod for said valve, an actuating lever pivoted at one end of said rod and at its other pivotally connected to the tank, a downwardly projecting push rod integrally connected with said lever, said push rod extending through the side wall of the tank, whereby the valve may be operated from the outer side of said tank."

943,638, Apparatus for air moistening—Walter H. Webb, William G. Brettell and Alexander J. Adamson, Liverpool, England.

PERFECTS A VALVELESS PUMP.

Thomas D. Smith, of Portland, Ore., is reported to have perfected a valveless pump, which to a great extent would revolutionize irrigation methods, and it is expected that he will build a factory in Portland for the manufacture of valveless pumps.

Burlington, Iowa.—The Russell Sewage Disposal Company, of this city, furnished the nine sewage disposal systems which have been installed at as many suburban dwellings near Iowa City, Iowa. Attorney Milton Remley, in that city, is the owner of these buildings.—Adv.

The ordinary type of union is a constant source of trouble, owing to the inevitable deterioration of the gasket under pressure. Next week on page 17 will be found a report of a case in point. Why be troubled with leaky unions? **"KEWANEE"** UNIONS require no gasket, and can readily be disconnected and reconnected at any time.

NATIONAL TUBE COMPANY, Pittsburgh, Pa

CLASSIFIED ADVERTISEMENTS

Help Wanted

Wanted.

Correspondent experienced in plumbing line, preferably one having some knowledge of manufacturing. Man between 25 and 30 living in Pittsburg or vicinity preferred. Must be of active mind and qualified to compose clean and concise letters on sales end of business. Applicants please state age, experience, salary desired and other qualifications. Address application to Sales Department, P. O. Box 1226, Pittsburg, Pa.

Wanted.

Reliable man for first class steamfitting contracting business; must be capable and ready to invest $2,500 in the business. An exceptional opportunity for the right man. Address No. 191, "Domestic Engineering," 325 Dearborn St., Chicago.

Journeymen Wanted.

Sober, ambitious journeymen, competent to earn $4.50 per 8 hour day; steady work for the right men; no applications considered without references; transportation will be refunded to applicants accepted. J. M. Robb, 602 Y. M. C. A. Building, Peoria, Ill.

Wanted.

Salesmen calling on power plant trade to handle small line of steam specialties for everyday use, by established manufacturing concern with reputation for high grade material. Liberal commission to energetic, reliable men. Address W. T. Jameson, 100 Surrey Rd., Mansfield, O.

First-class representative by a large manufacturer of boilers and radiators, for the State of Ohio. Thorough experience in the heating business, both as engineer and salesman, required, also a personal acquaintance with the trade in the locality mentioned. State experience, present employment, references and salary desired. Address No. 174, "Domestic Engineering," Chicago.

Situations Wanted

Position Wanted

By experienced office man who is a stenographer and correspondent; Chicago or vicinity; Chicago references. No. 188, Domestic Engineering, Chicago.

Young Man

With an extensive acquaintance among architects and builders in Chicago, recently employed by one of the largest manufacturing firms in the west, seeks a newer and more remunerative field for his endeavors. Address No. 189, "Domestic Engineering," 325 Dearborn St., Chicago.

Salesman.

Boilers and radiators, will be open for proposition January 1st; eight years' road and office experience best of references. Address No. 190, "Domestic Engineering," 325 Dearborn St., Chicago.

Situation Wanted

By plumber and steamfitter with some experience in the tinning line; am a steady, sober and industrious man, and can furnish references if desired. Address G. Martin, P. O. Box 314, Huntley, Ill.

Plumbing Schools.

Learn plumbing on new buildings in four months. Tools furnished. Master Plumbers' Trade School, 3659 Finney Ave., St. Louis, Mo.

Books

Roughing-in House Drains. Edited by Jno. K. Allen. A complete guide to the work of roughing-in plumbing, from the digging of the sewer to the finishing length of the soil and vent stacks, giving each step to be taken and telling how and why it is done. 6¼x4¼ inches; 134 pp.; bound in boards. Postpaid, 50 cents. "Domestic Engineering," Chicago.

Notes on Heating and Ventilation. Second edition. By Prof. John R. Allen. Written primarily for the steamfitter and designer of heating systems. Reduced to as brief a form as possible, so that readers can readily find notes or data desired. Bound in cloth, 6¾x4¾ inches; 272 pp.; postpaid, $2.00. "Domestic Engineering," Chicago.

Plumbing Catechism. By Charles B. Ball. Second edition. This book formulates, in question and answer form, the basic principles of plumbing design and practice. It is therefore especially commended to students in engineering and trade schools, and to master and journeymen plumbers, preparing for examinations. Bound in cloth; 6¾x4¾ inches; 100 pp.; postpaid, $1.00. "Domestic Engineering," Chicago.

Tables for Calculating Sizes of Steam Pipes. By Isaac Chaimovitsch. These tables furnish a method of determining sizes of steam pipes for low pressure heating without laborious methematical calculations; bound in cloth; 4½x6⅞ in.; 47 pp.; postpaid, $2.00. "Domestic Engineering," Chicago.

Swimming Pools. By Jno. K. Allen. Their construction; cold and hot water supply; various methods of heating the water; directions as to selecting correct sizes of heaters. A practical guide to the subject. Over thirty illustrations; 6½x4¾ inches. Postpaid, 50 cents. "Domestic Engineering," Chicago.

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Adapted for ½, ⅝ and ¾ inch pipe.
A great time saver and costs but little. Send for price.
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For Wash Bowls, Sinks, Bath and Wash Tubs
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Adjustable Radiator Foot Rest

The time saved on each job pays for them—can be used for bath tubs and other fixtures

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